MARCH 18, 1961

# Chemical Week

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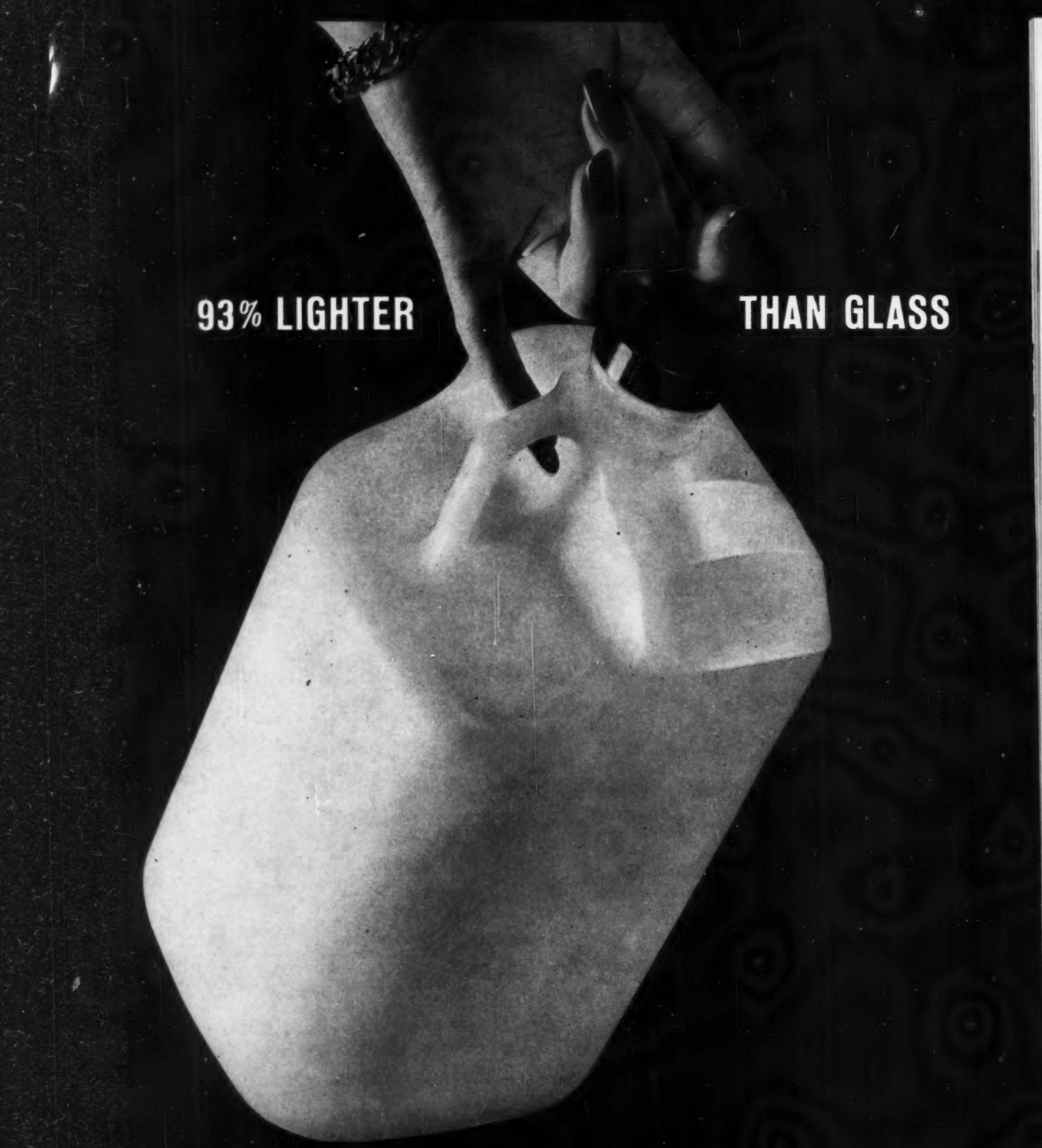


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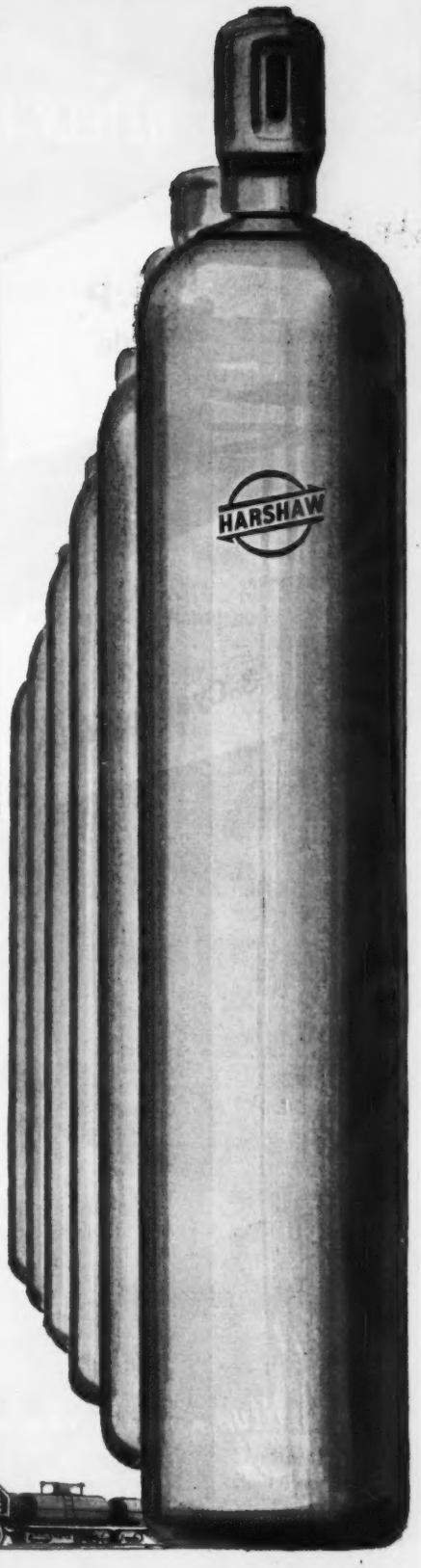


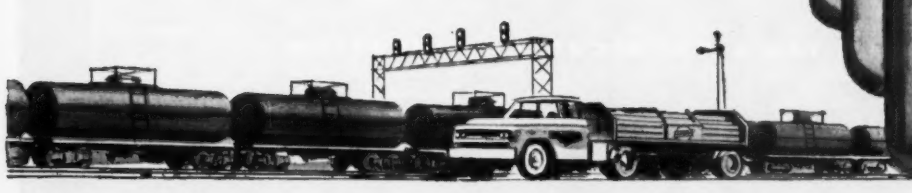

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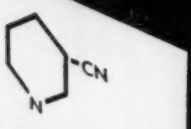


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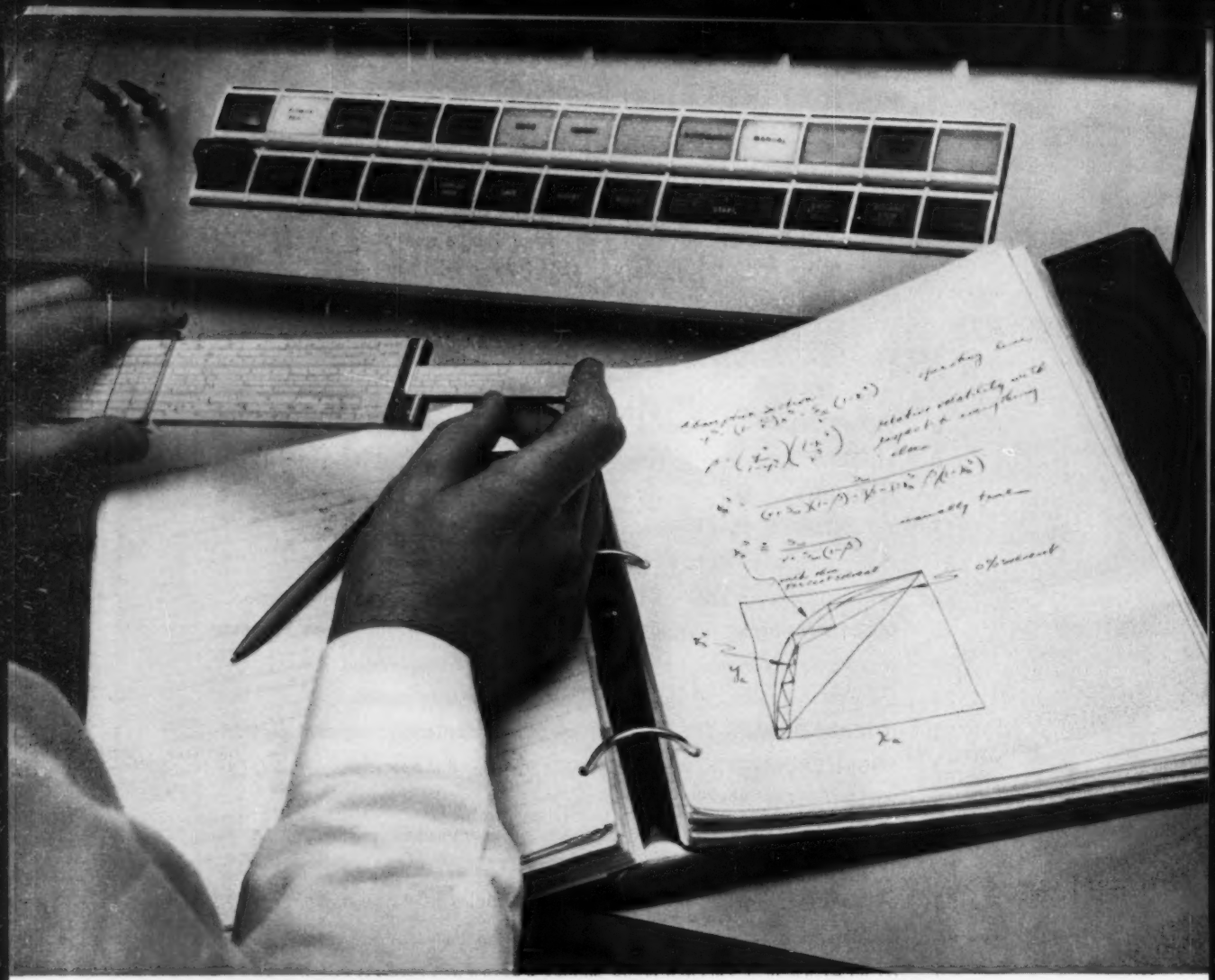

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# African Plant? Why Not?

THE PRIMARY OBLIGATION of business is to make a profit. But if in discharging that obligation it can also help satisfy the social, political and economic aspirations of mankind, so much the better.

Right now, Africa hardly looks like the place to begin. The massacres in the Congo, the riots in Angola, the smoldering unrest in the Union of South Africa, the rampages in Kenya—these are certainly enough to turn a businessman away. If he should do business in Africa, could he escape with his skin, much less a profit?

Listen to Robert I. Fleming, resident director of the Rockefeller Brothers Fund in Nigeria and Ghana. An American who has lived in West Africa for the past 10 years, Fleming campaigns with missionary zeal to convince American and other businessmen that this is a likely place to establish industry.

"Western businessmen come out here and hesitate," Fleming says. "They ask the Africans for cast-iron guarantees that are impossible to give. How can anybody guarantee that a stable government will be in power two years from now?"

During the past two years the fund has sponsored several feasibility studies to learn what West Africa needs in the way of new industry and, in effect, Fleming is a middleman between the foreign investor and the Nigerian and Ghanaian governments. No one is more aware than Fleming of the risks inherent in investing capital in Africa. Nevertheless, he has 57 development projects under consideration in Nigeria alone.

"Africans are doing what they can," says Fleming, "to create a favorable climate for investment. They are reducing corporate taxes, introducing import taxes as a means of encouraging local manufacture, and in some instances are signing special agreements with American firms that have the effect of investment insurance programs.

"One formula that the Rockefeller Brothers Fund has used with some success goes like this: The investing company puts up 50-60% of the required equity. It gradually retires from this position as Nigerians are able to purchase shares. During the period of such divestment the company's position is protected by firm management contracts that leave no question of who is in day-to-day control of the enterprise.

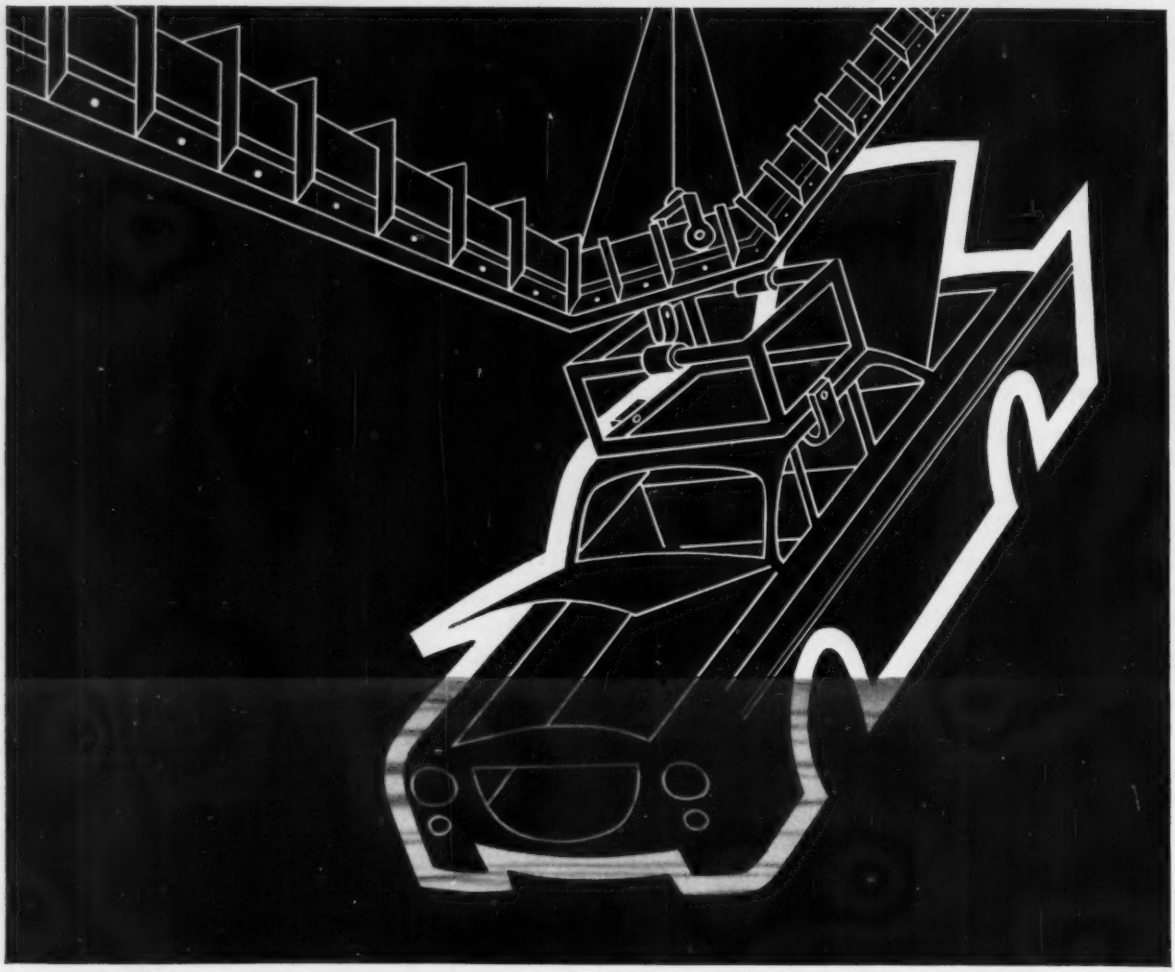
"Meanwhile every effort should be made to build a cadre of managers from among the local people. Ultimately the point may be reached where the foreign investor may hold a 20-30% position in a number of industries with perhaps a continuing supervisory role in management.

"Such arrangements guarantee the investor an opportunity to recover his original outlay and assure him of a reasonable profit. The goodwill that he establishes should be the best guarantee of a continuing profit position, albeit a minority one."

It seems to us that Fleming is perhaps too sanguine about the goodwill engendered; in the past year the altruists have been massacred along with the exploiters. Nevertheless, he makes a case for American participation and points to the frightening alternative:

"The quality for which America holds itself pre-eminent is the capacity to organize and develop industrial enterprise. Logically this should be the channel through which we extend our greatest effort by way of giving help to the developing countries of Africa.

"If we don't, there is Russia standing outside the door. The typical Russian response to any request is a ready affirmation. If an African government inquires about 2,000 tractors, the Russians ask, 'When do you want them?' Of course the bill comes later, and it's a big one."



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# LETTERS

## The Questions . . .

TO THE EDITOR: Mr. Lempert's article (*Feb. 18, p. 63*) is both naive and insulting. Both my management and the managements of the other process companies have a working knowledge of statistical methods that goes beyond awareness of seasonal variations and the use of logarithmic plotting.

He further suggests the need, by inference, of a Univac computer to calculate seasonal variations. Any first-semester statistics student can calculate seasonal variation with a slide rule or desk computer in an hour or so, and, as a matter of fact, write a better paper on the use of statistical tools than this effort of Mr. Lempert's. . . .

J. L. JOHNSON
Market Research Dept.
The Dow Chemical Co.
Midland, Mich.

TO THE EDITOR: With reference to the CHEMICAL WEEK Report "Peril in Numbers" (*Feb. 18*) the logarithmic scale is good but not as good as claimed. Referring to the charts on p. 65, the main reason that the arithmetic chart "distorts the relative growth rates of FRB index and formaldehyde output" is that index and output are plotted on different scales. By using a scale for the FRB index of one-tenth the formaldehyde output scale, as was done on the logarithmic chart below, the curves may be made practically parallel. By using a somewhat larger scale, the FRB index may be made to increase faster than the formaldehyde output. The point here is that the arithmetic chart may lead to distortion, not by giving greater weight to absolute changes but by permitting an arbitrary selection of scales, whereas the logarithmic scale permits no such arbitrary selection.

My other complaint concerns the use of such charts in forecasting. Mr. Lempert implies that only the arithmetic scale can lead to false results by extrapolation. But any chart extrapolated improperly will lead to false results. Before deciding to use a straight-line extrapolation it must be determined that a straight-line correlation is valid. And if such a correlation is valid for points plotted on an arithmetic scale, it definitely is not valid for the same points plotted on a logarithmic scale, and vice versa.

I have not analyzed the charts plotted on p. 65, but the logarithmic curves look humpbacked to me. If a statistical analysis showed that the arithmetic curves are correlated more satisfactorily by a straight line than the logarithmic curves are (as I suspect they would) it would be improper to extrapolate the logarithmic curves as shown.

Of course, past performance is not necessarily a reliable guide to future performance, as Mr. Lempert points out. However, this consideration is unrelated to the problem of the type of scale to be used in plotting a chart. Offhand, I would say that the predictions for formaldehyde output and FRB index in '64 obtained from the logarithmic chart are not inherently more reliable than those obtained from the arithmetic chart, and probably less. The point here is that the proper method of extrapolation is not dependent on the scale used in plotting but upon a proper analysis of the data upon which the plot is based.

The most that can be said is that where rate of growth is expected to be constant the logarithmic scale should be used, and where absolute growth is expected to be constant the arithmetic scale should be used. Both types have their proper applications.

H. L. STRICKLING
Product Development
General Chemical Division
Allied Chemical Corp.
New York

## . . . And the Reply

TO THE EDITOR: I think Mr. Strickling in his first point is in complete agreement with me. To say an arithmetic chart permits an arbitrary selection of scales, as Mr. Strickling states, is to say in other words that different weights are given to absolute change; in one case, an inch on the chart may represent an absolute change of 1; in another it may represent 10; in another, 1,000. The logarithmic chart, as Mr. Strickling states, permits no such selection of scale (that is, weights). This, then, is precisely what was meant in saying the arithmetic chart may lead to distortion of growth

rates by giving greater weight to absolute changes; the log chart gives no weight to absolute changes. Mr. Strickling's point—that by manipulation of scale (by giving different weights to absolute changes) formaldehyde can be made to parallel or increase more slowly than the FRB index (as well as increase more quickly, as we have shown)—makes my point most eloquently; no such manipulation is possible on a log chart.

Any implication that only arithmetic scales can lead to extrapolation difficulties was never intended. The projections were not intended to be forecasts but simply a means of shocking those who blithely apply the method of least squares to their raw data; shocking them by showing how different a projection based on a constant percentage change rather than on a constant absolute change can be. Note, for example, that my own forecast of formaldehyde at no point introduced the trend-line projection. Certainly, I had no intention of suggesting that all growth is by percentage increments; my experience has simply been that there is confusion among management in failing to distinguish between growth rate and growth by absolute increments.

LEONARD H. LEMPERT

## Cary's Research Growth

TO THE EDITOR: We at Cary Chemicals took special pride and enjoyment in reading your article (*Feb. 11, p. 23*) . . . Cary is now manufacturing PVC sheeting laminations and embossing and printing; we do not manufacture PVC film. Cary is one of the largest producers of vinyl compound, primarily for the wire and cable industry (actually, this is the way our company got started, and we still find it is a profitable and growing part of our business).

Your article states that the deteriorating price situation is a current one. However, this is erroneous because the situation has reversed itself in the past few months.

Cary Chemicals Inc. owns 24% of Chemirad Corp., which you refer to in your article as Chemical Corp. This company is the only U.S. manufacturer of ethylene imine, although most of our inventory is obtained abroad. Ethylene imine is a very reactive chemical and will show considerable growth as increased volume reduces the price.

We have always felt confident about our marketing ability, and this is one reason why Raymond Marks is now executive vice-president and general manager of Cary's operations and not sales vice-president, as your article indicates.

One area you did not mention in your article—and one that we feel will be an important factor in enabling us to profitably reach our goal of 200 million lbs. of PVC polymer per year—is that of research and development. We are planning a fivefold increase in our research and development budget over the next five years.

RUDOLPH W. KUGLER
Vice-President
Planning and Administration
Cary Chemicals Inc.
East Brunswick, N.J.

*The last sentence in the article belongs to the story on p. 23 that follows the Cary article*—ED.

*CW* welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

## MEETINGS

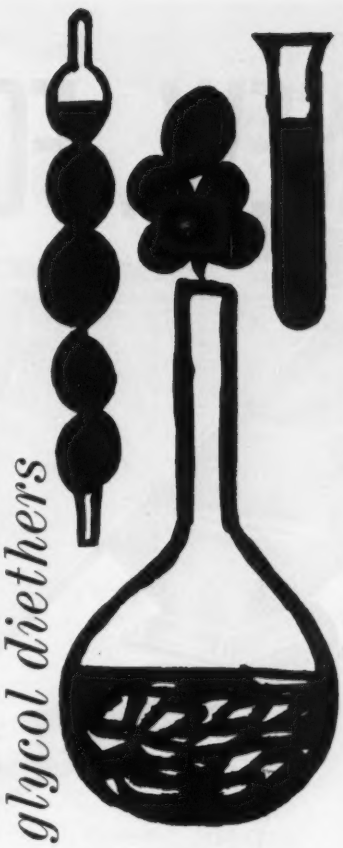
**Western Metal Congress and Exposition** (12th), Ambassador Hotel and Pan-Pacific Auditorium, Los Angeles, March 20-24.

**Nuclear Congress,** Chicago, March 20-24.

**American Power Conference,** 23rd annual meeting, Sherman Hotel, Chicago, March 21-23.

**American Chemical Society,** national meeting, St. Louis, Mo., March 21-30. Division of Chemical Marketing and Economics, Kiel Auditorium, St. Louis, March 21-24.

**American Institute of Chemical Engineers,** Chicago section, symposium; themes: new developments for chemical processing, new developments for the engineer and management; Conrad Hilton Hotel, Chicago, March 22.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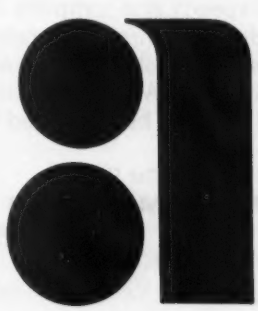

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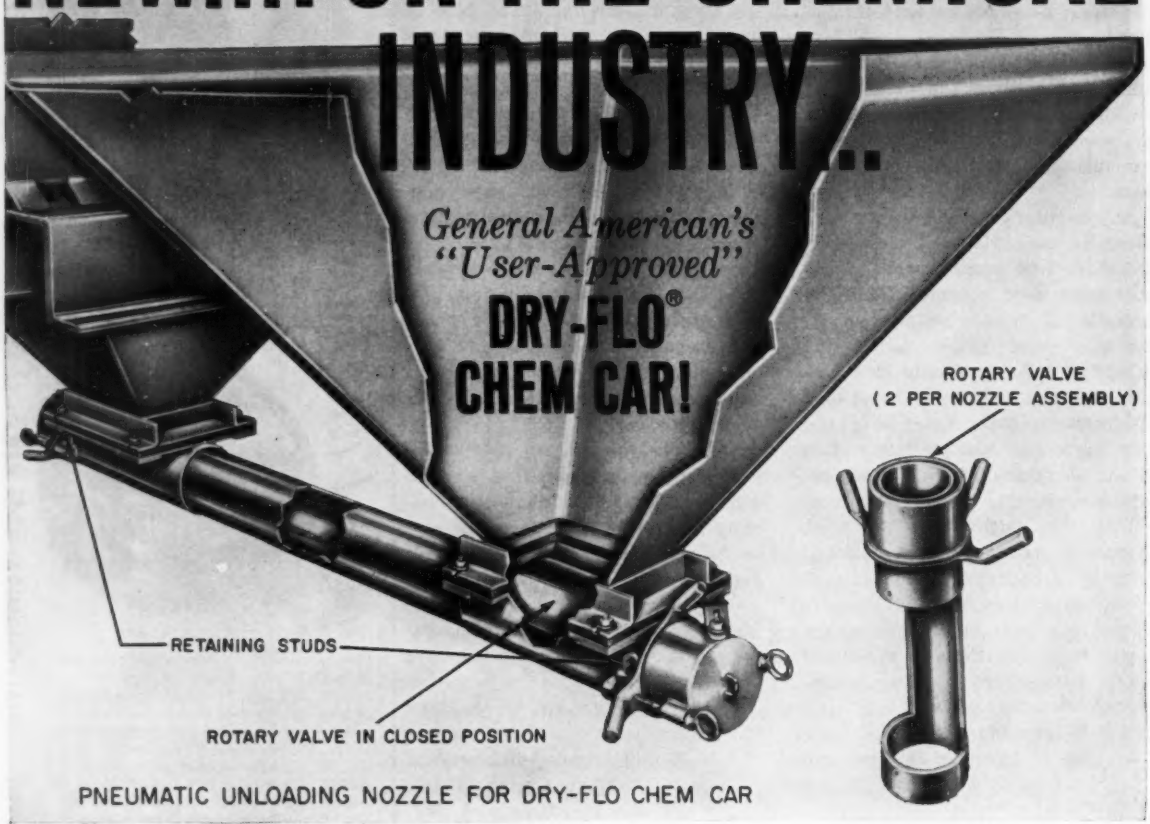


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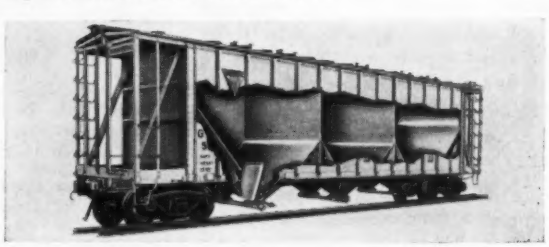
Designed especially for dependable, safe bulk shipment of polyethylene, polystyrene, polypropylene and similar chemicals in dry form.

The new 3,500 cu. ft. capacity Dry-Flo Chem Car was developed for the chemical industry to provide a car which would assure freedom from contamination and moisture pick-up while in transit and during unloading.

The car is welded throughout, has fully-gasketed openings, unloading nozzles (created especially for pneumatic unloading) designed for fast disassembly–speedy and complete cleaning. Also the car is divided into three separate compartments.

Illustrated is a schematic view of the new, exclusive General American unloading nozzle. Unloading flow can be controlled to accommodate individual unloading systems. Three outlets are provided on each car, thus requiring fewer connections and adjustments, minimizing the possibility of contamination.

275 of these cars are already in service or on order. If you would like further information on the Dry-Flo Chem Car, write to . . .



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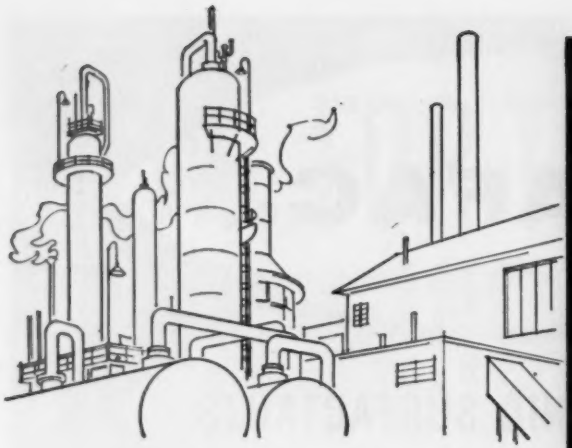
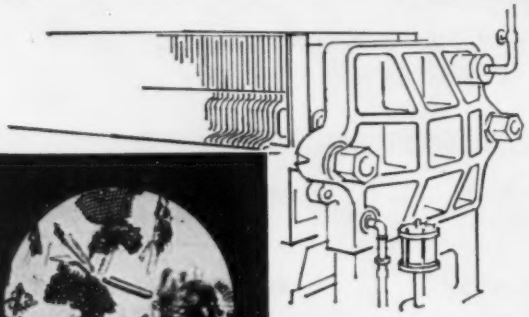
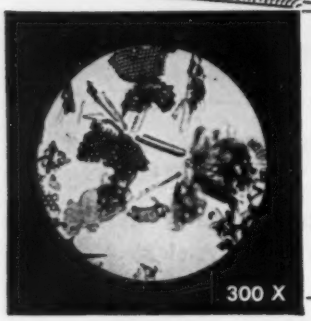
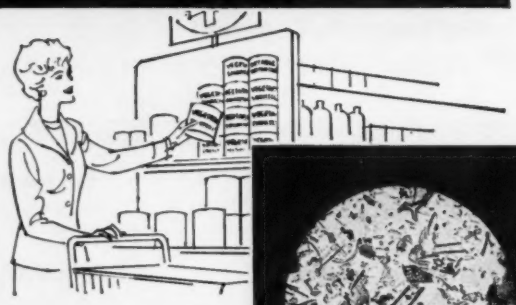


**For flow rate plus clarity**—Hyflo Super-Cel has the right combination of large and fine particles. Heavily used in chemical processes such as caustic soda production.

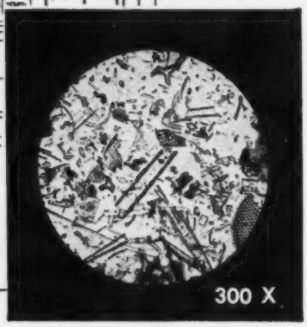





**For fast flow rates**—Celite 545 has a higher proportion of coarse particles. Frequently used for clarification of resins and other viscous liquids.



**For maximum clarity**—Filter-Cel has a relatively fine particle size distribution. Used in producing lard, salad oil, other hydrogenated oil products.




***In diatomites, Johns-Manville precision processing works for you***

# Celite has the exact grade for every filtration need from fast flow rate to maximum clarity

Study samples of various filtration grades of Celite* diatomite with the unaided eye. Rub them between your fingers. One grade looks, feels very much like another.

Then compare these grades under the microscope. Each has its own distinctive particle size distribution. Each is precision-milled to fill the most exacting filtration requirements, ranging all the way from maximum flow rate to maximum clarity.

*Celite 545*, for example, with a higher proportion of large to fine particles, is used to remove large suspended impurities at maximum flow rates. *Hyflo Super-Cel®* has a balanced particle size distribution, combines good liquid clarity and moderate flow rate. But *Filter-Cel®* has a much higher ratio of small particles, is tailored for use where high clarity outweighs flow rate.

Whatever your filtration problem—Johns-Manville can furnish the "right" grade for the job. You have a choice of 9 intermediate grades *plus* many special grades. Each comes from the largest and purest commercially available deposit. Each is processed and graded at the same plant under the same uniform conditions.

For information on specific filtration or mineral filler problems, talk to your nearby Celite engineer, or write to us. Johns-Manville, Box 14, N. Y. 16, N. Y. In Canada, Port Credit, Ont.

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out of oven-ready biscuits
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Packaging refrigerated biscuits has its occupational hazards. If the dough doesn't expand fast enough to fill the container completely, spoilage results. Let it rise too fast before cooling to halt the reaction, and you have packages popping all over the place.
Secret of success is controlled "proofing time," based upon sodium acid pyrophosphate with a predetermined . . . and stable . . . rate of reaction.
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Close attention to the user's requirements is characteristic of FMC's experienced service in phosphates. If you use SAPP . . . or any of the other products listed below . . . we'd like to show you how well we can serve you.
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*39-square foot titanium heat exchangers handling inhibited sulfuric acid cost $1140, replace conventional equipment priced at $1111. Result . . .*

# Lifetime Titanium heat exchangers pay for themselves in nine months!

Titanium's anti-fouling characteristics, its corrosion immunity in inhibited sulfuric acid, and its competitive prices have combined to solve a major production problem at two large pigment plants.

Forty-five titanium heat exchangers, manufactured in eight weeks, have been sped into service in a 30% sulfuric acid solution inhibited by metallic sulfates. They replace standard-metal equipment which has yielded a nine-month service life. Project engineers state: "Titanium will last a decade."

The self-cleaning titanium heat exchangers retain high heat transfer indefinitely . . . have permitted a steam cutback from 125 lbs to only 30 for an identical heating job. Yearly savings in steam and maintenance are valued at $50,000.

Progress in titanium raw material prices and fabrication costs makes the application possible:

**Fabrication.** Selection of the *right* fabricator is always important; with titanium, vital. Example: construction quotes from six bidders ranged from $363 to $2000 per heat exchanger. Either extreme could have prevented the application, but one source—recommended by TMCA—covered quality and price requirements like a blanket. . . . Saffran Engineering Company's $464 per unit. The picture then showed:

**Price.** Conventional heat exchangers at $1111; the titanium units at $1140! The titanium test model, installed in 1957 and still operating, cost $2290. Titanium prices have been cut in half in the last four years!

If you are faced with maintenance problems in equipment operating in inhibited sulfuric acid . . . or wet chlorine . . . or hypochlorites . . . or urea . . . titanium merits serious study. TMCA can help you locate the fabricator best qualified for your specific need . . . the economies can be yours for the asking.

*Get the facts: The welding story . . . performance data . . . history of these titanium heat exchanger coils. Write today.*

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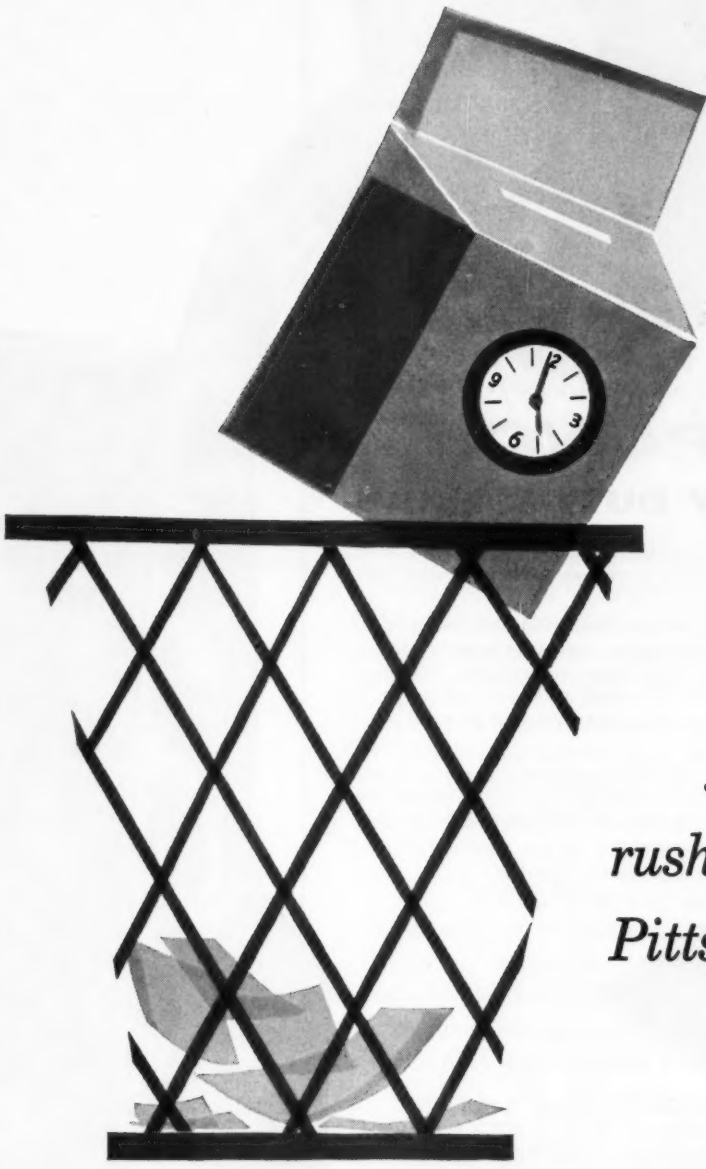

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In theory it's easy . . . just add more phosphate. But in practice it takes a bit more doing to keep the phosphate in solution and the surfactant stable in contact with strong alkali.

Stepan hydrotropes make it possible for you to formulate otherwise incompatible materials. They are excellent solubilizing and coupling agents for organic surfactants and inorganic phosphates and silicates. Three types are available: Stepanate K (potassium toluene sulfonate) . . . Stepanate T (sodium toluene sulfonate) . . . Stepanate X (sodium xylene sulfonate). *Note: They also are useful as cloud point depressors in light duty liquid detergents.*

Likewise, our new Amidox series of ethoxylated alkylolamides is a happy marriage of the best properties of two popular families of surfactants. Ninol alkylolamides are foam boosters and viscosity builders. Stability toward strong alkalis and longer shelf are added when these alkylolamides are ethoxylated.

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# Business Newsletter

CHEMICAL WEEK
March 18, 1961

**New Petrochemical projects are in the wind for the Southwest—** but they won't be built on the Gulf Coast.

• A new styrene monomer plant reportedly will be built at Tulsa, Okla. This would give Sunray Mid-Continent Oil Co. a two-of-a-kind hand in styrene, since the new plant at Tulsa is said to be planned as a virtual twin of the 60-million-lbs./year styrene plant now under construction at this company's Corpus Christi, Tex., refinery. It now appears that U.S. styrene capacity will exceed 2.4 billion lbs. by the end of '62 and will be close to 2.8 billion lbs./year by '65.

• Texas talks is that W. R. Grace—which has just completed a big nitrogen fertilizer expansion in Tennessee (*also see Market Newsletter, p. 85*)—is about to launch a 250-tons/day ammonia (also urea) project at Big Spring, Tex., adjacent to the refinery of Grace's 53%-owned subsidiary, Cosden Petroleum Corp. According to trade reports, Cosden would manage and operate the new plant and Plainsman Supply Co. (Plainview, Tex.) would handle distribution. Natural-gas feedstock would be purchased.

•

**Alkylamine production in England will be boosted heavily** by a coming expansion of Imperial Chemical Industries' works at Billingham. The plant now produces mono-, di- and triethylamines, and mono-, di- and trimethylamines, with a combined capacity estimated at 2,000-3,000 long tons/year. By the end of the year, ethylamines capacity will be doubled. By '63 a new methylamines plant—said to be one of the world's largest—will replace the present unit, increasing capacity fivefold. ICI is the only United Kingdom producer of these chemicals. New research laboratories and pilot-plant facilities will be included in the expansion. (*For more on methylamines, see p. 89.*)

ICI is also moving ahead fast into polypropylene. It will double the capacity of its 25-million lbs./year, $8.4-million plant that went on-stream last December at Wilton, Yorkshire. The new capacity will be in place within the next 18 months. Biggest single outlet for the resin will be molding, but much will also go into yarns and fibers. ICI has the U.K. license for the Montecatini process. Later this year Shell will become the U.K.'s only other PP producer when its 67-million-lbs./year polyolefin plant starts up. Half of the plant's output is slated for low-density polyethylene, and half for a combination of high-density PE and PP.

•

**U.S. companies are still moving in on the European chemical** boom—with or without European partners.

Continental Oil Co. (Houston) has set up a 50-50 subsidiary with the German oil company Deutsche Erdol AG. to make Continental's Alfol line of industrial alcohols near Hamburg. The new firm, Condea

Petrochemie-Gesellschaft, will have a 50,000-tons/year plant in operation in mid '63.

Hercules Powder, going it alone, has set up a Finish subsidiary, OY Hercofinn AB, to make paper chemicals. The company will have a plant in operation at Tampere in first-quarter '62. Hercules is now developing the Finnish market with products from Hercules Kemiska AB of Sweden. OY Hercofinn will make Pexol rosin size, resin emulsions and defoaming agents.

•

**Another joint-venture helium project awaits government okay.** U.S. Industrial Chemicals needs only a "satisfactory" contract with the government to go ahead with its plans to construct and operate a helium plant of "sizable capacity" in Texas. USI's partner in this would be Panhandle Eastern Pipeline Co., one of its current associates. As in most other such proposed helium ventures (*CW Washington Newsletter, Jan. 28*) the government would be the only customer.

•

**Canada's surplus sulfur is piling up according to schedule** in the Alberta gas fields (*CW, Dec. 17, '60, p. 21*). In the past two weeks the Alberta Oil and Gas Conservation Board has approved applications to build gas processing and sulfur recovery units (*see p. 25*) that will add up to 1,540 long tons of sulfur daily to the piles. These projects were anticipated in the 1.7-million-l.t./year Canadian sulfur capacity projected for the end of '61.

Latest approval is for an $11-million project to be built by Saratoga Processing Co. Ltd., subsidiary of Westcoast Transmission Co. Ltd., and Jefferson Lake Petrochemicals of Canada Ltd. Saratoga will process 75 million cu.ft./day of sour gas, deliver up to 59 million cu.ft./day of pipeline specification gas for export by Westcoast. Jefferson Lake will recover 400 l.t./day of sulfur. No one has yet come up with a solution of the surplus sulfur problem (it's too distant from markets). A sulfur pipeline is still just in the thinking stage.

•

**Olin Mathieson makes news twice this week:**

• OM is taking the lead in setting up a new joint subsidiary—United Nuclear Corp.—that's described as the nation's first integrated organization in nuclear energy. UNC will consist of OM's nuclear fuels operation, commercial operations of Mallinckrodt Chemical's Nuclear Division, and all of the present Nuclear Development Corp. of America.

• OM is streamlining its "corporate image" by dropping all but the first word in its name in all advertising and other promotional work. For the present, at least, there'll be no change in the company's full legal name; but all external communications will carry only the "OLIN" signature. The company will project its new look starting next month with a $2.5-million advertising campaign.

*In 1940, the average farmer fed only 10 people. Today, Shell's aldrin helps him feed 25.*

# BULLETIN:

## Shell Chemical reveals why one farmer brings you 2½ times as much food today as in 1940

**Mechanization is part of the answer. The biggest part, however, lies in controlling pests which still cause 13 billion dollars of damage every year.**

**Shell Chemical produces insecticides, soil fumigants and other pesticide chemicals to help farmers control these pests.**

**Read what just one of these remarkable products, aldrin, does for farmers—and for you—in terms of bigger yields of healthier, better corn.**

TWENTY years ago, the average Iowa corn farmer got a yield of 52 bushels per acre. Today, he gets 65 bushels.

Many factors contribute to this. Among them are increased use of fertilizers; improved soil conservation and control of diseases, weeds and destructive insects above and below ground.

### 18 underground enemies

There are at least 18 different soil insects that attack corn.

Some, such as wireworms, damage seed so severely that it can't even start to grow. Others, such as corn root worms, sever roots of growing plants, cutting off their food and water supply and leaving them vulnerable to toppling by heavy winds and rains.

### Economical weapon

Shell Chemical's aldrin gives farmers low-cost protection against all 18 insects. One application protects a crop for an entire season.

Where insect infestation is severe, aldrin can *double* yields. Where infestation is average, yields go up enough to pay for the aldrin and its application at least *three* times over.

### Corn flakes and plump pigs

Today, aldrin is protecting the roots of millions of acres of corn.

The results show up on your table. In corn on the cob. Corn bread. Corn flakes. Prime, corn-fattened beef and bacon. And in hundreds of other foods.

### One man feeds 25

It may surprise you to learn that this year the average farmer in America must raise enough food to feed twenty-five people including himself. That's 15 more mouths than he had to feed in 1940.

To do this he needs all the help he can get.

### How Shell helps

At Modesto, California, a Shell laboratory brings him some of this help.

Here, more than two thousand new agricultural compounds are tested. Sometimes, only one will meet exacting biological standards for continued development. If so, five years of extensive testing and more than a million dollars may be spent before an ounce is sold.

This is necessary. By 1975, 50 people may rely on one farmer for their daily food.

A Bulletin from

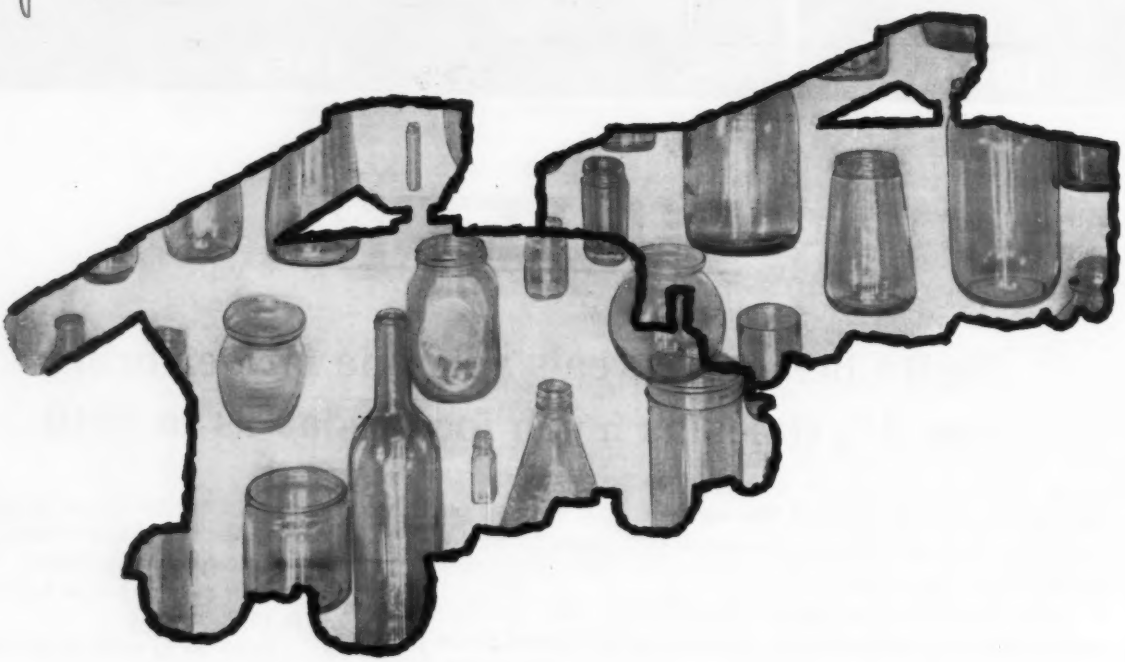
**Shell Chemical Company**

SHELL

**Agricultural Chemicals Division**

**WEST END**

# *advance planning* OF SODA ASH LOADING AND SHIPPING FACILITIES ANTICIPATES INDUSTRY'S GROWING NEEDS



WEST END as the qualified supplier in the West for 36 years has developed flexible and efficient soda ash loading and shipping facilities for rapid in-and-out movement of leased rail hopper cars and fast 24 hour a day loading of bulk trucks.

Advanced materials handling techniques and other innovations assure the delivery of this highest quality soda ash precisely in accord with customers' schedule requirements.

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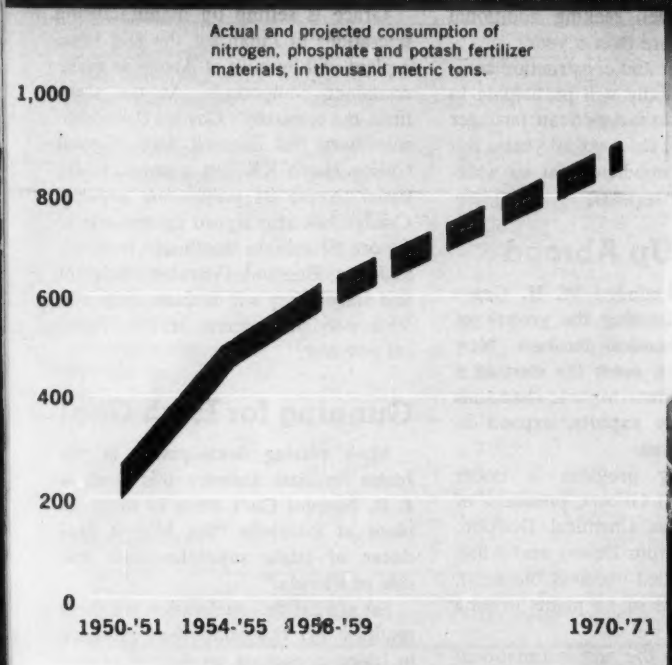
Chemical Week / MARCH 18, 1961

## Latin America: Growing Fertilizer Market



Mexican worker sprays anhydrous ammonia on sugar cane.

# Where Fertilizers Seek a Foothold

**Current moves to launch multimillion-dollar fertilizer projects in Aruba and Peru spotlight one of the biggest conceivable chemical industry markets still virtually untouched: the market for chemical fertilizers in Latin America.**

This vast area (from the Rio Grande to Cape Horn), with a population of nearly 200 million and one of the world's highest population growth rates, has an overwhelmingly agricultural economy but its farmers have hardly begun to use fertilizers. By a recent estimate, use of fertilizers in South America is only about 1% of the economic optimum rate.

Naturally, a practically untapped market of this size is not going unnoticed. Chemical companies, engineering companies, and financiers in the U.S., Europe and elsewhere are combing the whole area regularly for possible investment and/or export opportunities. But despite the big unsaturated market and the diligence of the scouting parties, very few economically sound opportunities are turned up.

**Moderate Growth Ahead:** Accordingly, the present outlook is that it will be a good many years before Latin America's fertilizer consumption approaches the economic optimum rate. Demand is sure to grow; conservative estimates look for a 50% increase by '70 (*chart, above*), and more optimistic projections are for a more than 100% jump within this decade. But even a doubling of the current rate of fertilizer use would leave Latin America far behind Europe and the U.S. in this respect.

Obstacles to more rapid growth of Latin America's fertilizer consumption are many and varied, with substantial differences from one nation to the next.

In Argentina—one of the world's largest agricultural producers—there is little incentive to use chemical fertilizers. Good farm land is still relatively cheap and plentiful; by-product organic fertilizers are in oversupply and available at low prices from the country's big meat-packing concerns; and the government has imposed heavy import taxes—ranging from 20% to 150%—on fertilizer chemicals.

**Government Holding the Reins:** In Brazil—the largest country in Latin America—policies of the new government are expected to lead to more intensive farming, and hence presumably greater application of fertilizer per acre. But most of the increased demand for fertilizer is likely to be supplied by government-owned plants, existing and proposed.

And throughout Latin America, there is the tremendous political, economic and social problem of largely primitive agriculture. The average farm is less than three acres, and the great mass of the farming population is uneducated in modern farming methods and is too cash-poor to invest in fertilizers or other production aids.

Several countries—such as Peru and

Ecuador—are trying to solve this problem through governmental programs that involve education, easy credit on purchases of fertilizers and pesticides, and the services of agricultural experts who journey from farm to farm and make sure that each farmer knows how to maker proper use of the fertilizers and pesticides.

**Discouragement on Crops:** Still another factor tending to discourage fertilizer consumption in Latin America: overproduction of some of the basic crops, such as coffee and cotton. With surpluses piling up and with prices toppling on world markets, producers of such crops have little economic inducement to invest in fertilizers.

An example of how this situation retards fertilizer industry development is seen in Colombia, where a 50-tons/-day nitrogen fertilizer plant has been under construction for the past eight years. It was started when coffee prices were up and world demand was high, and a local association of coffee producers was a principal investor in the Fertilizantes project. Then coffee prices went into a tailspin, and the coffee producers' association abandoned the project.

One constant barrier to heavier use of fertilizer in Latin America is the relatively high price (with respect to the prevailing economy) of chemical fertilizers.

**Import Competition:** Nevertheless, total fertilizer demand in Latin America is already substantial. Imports of manufactured fertilizer from the U.S. into Latin America during '59 amounted to nearly $32 million, with International Minerals & Chemical reportedly having the largest single share of this business. And U.S. exporters face incessantly keen competition from European and Japanese producers for Latin-American sales.

Local production of chemical and petrochemical fertilizers is bound to increase, but many of the choicest plant project opportunities are being taken by government-owned agencies. In Mexico, for instance, no private companies can be expected to undertake sizable new fertilizer projects until they see just how far and how fast the government-owned Petroleos Mexicanos (Pemex) goes ahead with its petrochemical program.

And even a receptive attitude on the part of the government doesn't always bring private companies rushing in. Peru's Ministry of Public Works has extended to April 15 the deadline for bids on putting up a 62,000-tons/year ammonium nitrate plant; and sponsors of the $26-million fertilizer complex now slated for Aruba have been seeking additional partners for more than a year.

U.S. fertilizer and construction companies undoubtedly will participate in a number of Latin-American fertilizer ventures during the next 10 years. But this market is nowhere near so wide-open as it first appears.

## Gearing Up Abroad

**International-minded W. R. Grace & Co. is accelerating the growth of its overseas chemical business. New moves this week mark the start of a program to produce organic chemicals abroad, increase exports, expand licensing operations.**

The building program is under Henry ("Larry") Gilbert, president of Grace's Overseas Chemical Division. He moved up from Dewey and Almy (where he handled overseas business), is now in charge of 10 plants in nine countries.

First move in the new international program will be construction of a butadiene-styrene resin and latex plant at Naples, Italy. Also at Naples, Grace will build a larger plant to manufacture container-sealing compounds (demand has outgrown the present plant) and other chemical specialties.

South America, traditional scene of Grace activity, has several new plants, will get one more. Near Bogota, Colombia, Grace will build a plant to produce phthalic anhydride and plasticizers (presently imported), and will increase production of naphthalene, creosote and pitch.

Grace's Gilbert: Adding to his division's 10 overseas chemical plants.

Grace is setting up manufacturing operations in Japan for the first time: a plant will be built at Atsugi to make container compounds. At the same time, the company's Cosden Petroleum subsidiary has licensed Shin Nippon Chisso Hiryo KK (on a nonexclusive basis) to use its polybutene process. Cosden has also signed agreements to export $7 million worth of chemicals to Japan, England, Germany, Belgium and Italy. They will include 99% and 95% *o*-xylene, benzene and "a chemical polymer."

## Gunning for High Goal

**Most stirring development in the Idaho fertilizer industry this week is J. R. Simplot Co.'s drive to make its plant at Pocatello "the biggest producer of triple superphosphate this side of Florida."**

Set against this declaration are these realities: (1) the established presence in Idaho phosphate production of two heavyweights, Food Machinery and Chemical Corp. and Monsanto Chemical; and (2) Monsanto's phosphate capacity of 140,000 tons/year — 28% of the U.S. total—from its facilities in Idaho and Tennessee. Two newer Idaho phosphate plants — those of Bunker Hill and Central Farmers — are expected to get into full production this year.

But Simplot bolsters its forecast with past achievements and upcoming projects. The company is pushing a multimillion-dollar expansion program designed to hike output of all phosphatic materials 60-100%. Capacity of the present Pocatello plant, producing phosphoric acid and triple superphosphate, was doubled in '59 by a $2-million investment, resulting primarily in a new sulfuric acid plant. Key to Simplot's expansion plan was the purchase last July of Anaconda's Montana phosphate facilities (*CW Market Newsletter, July 9, '60*).

That plant will be moved by truck and rail to Pocatello on June 1, and, when onstream again, will produce up to 100,000 tons/year of ammonium phosphate, currently not manufactured in Idaho.

## Research Rising, Profits Level Off

Dollar figures in millions.

| | SALES | | EARNINGS | | RESEARCH | | CAPITAL | |
|---|---|---|---|---|---|---|---|---|
| | '60 Total | Change from '59 | '60 Total | Change from '59 | '60 Outlay | '61 Estimate | '60 Outlay | '61 Estimate |
| Abbott Laboratories | 126.0 | + 2.7% | 12.4 | — 4.7% | 8.2 | 9.0 | 9.5 | 11.0 |
| Amer. Home Products | 480.0 | + 6.4% | 48.6 | + 4.1% | — | Up | 21.0 | Same |
| Baxter Laboratories | 33.8 | +15.9% | 2.1 | +16.7% | 2.0 | 2.2 | 2.0 | 2.6 |
| Bristol-Myers | 144.5* | + 9.9% | 10.8 | +21.1% | — | Up | 2.0 | Same |
| Carter Products(1) | 56.6 | — 1.1% | 7.4 | —18.8% | — | Up | — | Down |
| Lederle Laboratories(2) | 160.0* | | | | 14.0 | 14.0 | — | Down |
| Lilly, Eli | 178.5 | — 4.5% | 18.8 | —20.0% | 19.7 | 20.0 | 8.5 | 10.0 |
| Merck & Co. | 218.1 | + 0.6% | 27.8 | — 4.9% | 20.9 | 21.4 | 9.4 | 10.0 |
| Norwich Pharmacal | 45.2 | +11.0% | 6.0 | +15.6% | — | Up | 2.3 | 2.7 |
| Parke, Davis | 200.0 | + 4.4% | 30.5 | — 1.6% | 12.7 | Up | 16.4 | 17.0 |
| Pfizer, Chas. | 269.4 | + 6.2% | 26.2 | + 5.3% | 13.4 | Same | 23.0 | 15.0 |
| Plough, Inc. | 46.0 | +35.3% | 3.2* | +25.0% | — | Up | 1.0 | Up |
| Richardson-Merrell(1) | 142.4 | +15.6% | 16.3 | +23.0% | 4.8 | 5.5 | 2.3 | Up |
| Schering Corp. | 87.1 | + 3.2% | 9.9 | —16.8% | 8.4 | Up | 6.6 | Up |
| Searle, G. D. | 36.9 | + 7.0% | 7.5 | + 2.2% | — | Up | 6-million | program |
| Smith Kline & French | 144.5 | + 7.2% | 24.0 | — 4.1% | 13.7 | 14.1 | 6.6 | 5.2 |
| Squibb(3) | 109.1 | + 2.3% | | | 8.0 | Up | — | Up |
| Sterling Drug | 219.5* | + 4.4% | 28.0* | Up | — | Up | 5.0+ | Same |
| U.S. Vitamin | 14.9 | + 0.4% | 2.1 | + 5.8% | 1.0 | 1.3 | .20 | 1.0 |
| Upjohn Co. | 159.4 | + 1.6% | 22.8 | — 2.0% | 16.0 | Up | 14.9 | 13.0 |
| Warner-Lambert | 197.9 | + 3.8% | 16.5 | + 0.7% | 5.4 | 6.0 | 6.8 | 10.0 |

* Estimated by CW. (1) Data for 12 months ended Dec. 31, instead of company's regular fiscal year. (2) Division of American Cyanamid Co. (3) Division of Olin Mathieson Chemical Corp.

# Caution Colors Drugmakers' '61 Strategy

**The pharmaceutical industry is cautiously moving ahead in '61. Most producers expect increased sales and earnings this year; but capital expenditures and investments in research—though generally up—will show only a limited rise, and few new products are sparking high enthusiasm.**

The industry's wariness stems from an unspectacular '60—and not from the threat of restrictive legislation or greater control from the Kennedy Administration.

A CHEMICAL WEEK survey of leading pharmaceutical houses finds research outlays holding steady at 5-10% of net sales (*table, above*). Schering Corp. and Baxter Labs. (*p. 66*), among others, are conspicuous for their plans to expand their research programs to any great extent.

A heavy share of the pharmaceutical industry's capital spending will go into foreign expansion, mostly in Europe. Merck, Warner-Lambert, Abbott, Searle and others have European plans. Several companies, among them Parke Davis, Squibb, Pfizer and Searle, plan South American projects. And Asia is getting its share of attention; Merck, for example, is expanding in India and Thailand.

Most domestic capital expenditures will go into expansions and modernizations, rather than into new plant facilities.

A drop in planned capital spending this year by some drug firms illustrates another aspect of the industry's generally cautious approach. These companies all completed major expansion programs last year and are delaying new programs until an anticipated sales and earnings pickup later in the year.

Current plans do not indicate a record year for new products. Companies surveyed will offer a small number of new drugs this year, but few see any outstanding new moneymakers to rival established lines of antibiotics, tranquilizers, steroids, etc.

The "wait-and-see" attitude most pharmaceutical companies express about the economy in the coming year is also reflected in their views of the Food & Drug Administration's tightening regulations and Sen. Estes Kefauver's proposed regulatory legislation aimed at drug industry advertising, licensing and patent policies (*CW Washington Newsletter, March 11*).

Consensus: there's little likelihood of injurious legislation. Moreover, most companies favor strengthening FDA, believe the result will be more protection to reputable houses rather than harmful policing or hobbling red tape. At worst it would be an additional bureaucratic nuisance, most believe.

Most companies predict that Kefauver would run into strong industry opposition on legislation to change licensing or patenting practices. In this, it is believed, the drug industry would be joined by all U.S. industry. Drug firms are keeping their eyes on legislative developments and will be ready to fight if necessary.

# CSC—Healthy and Growing

**A cost-cutting program "more basic than just letting people go," plus concentration on high-profit products, were the main tactics by which Commercial Solvents Corp. (New York) last year snapped out of an eight-year earnings slump. In the coming few years, more new products and plans for new plants and acquisitions hold hopes for growth on a now-profitable base.**

Last year's profit increase was a big one—a 70% jump in net income (from $2.85 million in '59 to last year's $4.84 million), at a time when sales dropped 11.5%. Officially, corporate sales sank from $70.4 million in '59 to last year's $62.3 million. But if operations of the automotive chemicals division are excluded, the sales figures become $60.9 million in '59 and $61.8 million in '60—a 1.5% increase. And, of course, the automotive segment should be left out for comparisons, since the nonintegrated antifreeze business (CSC had to buy all its ethylene glycol) was sold last year to Houston Chemical Co., which will produce its own glycol *(CW, June 11, '60, p. 21)*.

CSC President Maynard Wheeler—who was moved up to the No. 1 job after the '58 fiasco in which per-share earnings sank from '51's $2.22 to a low of 51¢—minimizes the effects of getting rid of the antifreeze business during this profit climb. He attributes the bulk of the earnings improvement to "hundreds of process improvements." These allowed the company to produce more with the same plants and men (few were laid off) and to squeeze more products out of raw materials. Also, wherever possible, products were upgraded to higher-profit items (e.g., ammonium nitrate instead of nitrogen solutions). Further savings were effected by revisions in distribution patterns, such as selling more nitrogen to customers close to the plant.

**Fractional Factor:** Wheeler—a 61-year-old chemical engineer who has been with CSC ever since his graduation from Purdue 38 years ago—explained that sale of the antifreeze business last year brought in only $285,000 in net income, including the '60 installment on the $2-million purchase price. And this "credit" item was nearly offset by a nonrecurring debit of $265,000 returned to the U.S. government because of price redetermination.

**Few Misfires:** A really big factor in earnings was Louisiana Gas Production Co., purchased in early '59. The latter now is able to supply about 50% of CSC's gas needs.

Northwest Nitro-Chemicals Ltd., the company's 45%-owned Canadian fertilizer affiliate that has been consistently in the red, is now expected to be "out of the woods by the end of the year." Raising hopes is a recent reorganization that allows Northwest to pay its debts more slowly (so it can show a profit on income), gives it new management, and orients distribution more toward the U.S. (source of 75% of the firm's sales.)

Nitroparaffins have never grown to true industrial importance. "We don't, at this point, consider that they are going to be the salvation of this company," Wheeler says. The real salvation, as the new management sees it, will be expansion "not chained to any one product group." Commercial Solvents spent about $2.5 million on expansion in '60, will spend up to about $5 million in '61. Between '61 and '65 the company will put about $40 million into new investments.

CSC's Wheeler: 'Nothing says we must stop at natural gas and bacteria.'

Expansion recently has been largely by acquisition. CSC has purchased two Italian drugmakers, and added four producers of feed supplement and veterinary vitamins to its highly profitable animal nutrition business *(CW, March 4, p. 21)*.

For the future, Commercial Solvents sees itself as a chemical company, in the broadest sense. "We now make chemicals mainly by using natural gas as raw material and by making bacteria work," Wheeler says. "But nothing says that that's where we have to stop."

This summer CSC will complete its long-talked-about caprolactam (nylon-6 raw material) pilot plant. Construction of a plant could begin later in the year. (The process starts with cyclohexane.) Among projects now in the research stage: a new ethanol process. CSC is now the country's largest buyer of industrial ethyl alcohol, produces only the high-grade ethanol itself.

Although Commercial Solvents says it is not concerned that a heavy bulk of its business is in ammonia and methanol (each roughly $10 million/-year in sales), it is clearly moving toward more specialized, higher-profit items. No one expects '60's spectacular earnings growth to be duplicated, but Wheeler is determined to keep the business growing—if at a more modest rate.

## Union Oil's New Move

**Union Oil Co.** (Los Angeles) is strengthening its position in the highly competitive West Coast fertilizer industry with its pending purchase of Pacific Guano, a wholly owned subsidary of Pacific Chemical and Fertilizer Co. (San Francisco).

Union's most recent move in fertilizers came in Feb. '60, when it had its subsidiary, Collier Carbon and Chemical go into production of sulfuric acid and ammonium sulfate.

Now, with the details of the $6.5-million purchase of Pacific Guano almost complete, Union's new foray into fertilizers will result in these acquisitions: (1) eight Pacific Guano outlets in California and Arizona; (2) an operating fertilizer plant in the San Francisco Bay area; and most important (3) a 60% interest in Western Chemicals, part owner (with Shell and Stauffer) of a new plant to make a complete line of solid fertilizers.

# national roundup

**Rounding out the week's domestic news.**

## Companies

**International Minerals & Chemical Corp.** (Skokie, Ill.) has acquired Bioferm Corp. (Wasco, Calif.), a vitamin $B_{12}$ producer, in a stock exchange: 80,000 shares of IMC for all outstanding Bioferm shares. The new addition will operate under IMC's Amino Division (*CW, Dec. 17, '60, p. 22*).

**Thiokol Chemical's** (Trenton, N. J.) Redstone Division has awarded a contract to Dumont Mfg. Corp., subsidiary of H.I. Thompson Fiber Glass, for production of all-plastic nozzles for the first- and second-stage rocket motors of the Army's Pershing missile.

**Ethyl Corp.** (New York) and Catalysts & Chemicals (Louisville, Ky.) have agreed to do joint research, development and testing of catalysts for auto fume control devices. The new team becomes another entry in the race to develop exhaust-fume controls (*CW Technology Newsletter, Feb. 18*).

**Baldwin-Montrose Chemical Co.** has emerged—with board of directors' approvals—from the three-way merger negotiations among Montrose Chemical (Newark, N.J.), Baldwin Rubber (Pontiac, Mich.) and Centilivre Brewing (Ft. Wayne, Ind.) (*CW, Oct. 1, '60, p. 26*). The new company, now applying for American Stock Exchange listing of its 1.5 million shares of common and preferred stock, had combined '60 sales of $30 million.

**Vitro Corp.** (New York) has sold Berkshire Chemicals (New York)—a wholly owned subsidiary since '56—to Berkshire's president, Malcolm H. McAllister. Berkshire—with gross annual sales of $3 million—is an importer and exporter of agricultural and industrial chemicals, nonmetallic minerals and ores.

## Expansion

**LPG, Sulfur:** Shell Oil of Canada, Ltd., and Home Oil (Calgary, Alta.) now have approval-in-principal from the Alberta Oil and Gas Conservation Board for their gas plant projects: the $30-million Shell unit at Watertown (*CW, Nov. 12, '60, p. 29*) and the $4.5-million Home facility at Carstairs (*CW, March 4, p. 24*). Final approval now depends only on Alberta Dept. of Health certification of air-pollution measures.

Western Leaseholds (Calgary)—with the board's go-ahead—starts construction next month on its $6-million Wildcat Hills gas processing plant, plans to have it onstream by mid-December. Daily sulfur recovery, set initially at 75 long tons, is expected to reach 120 l.t.

**Acetylene:** Union Carbide's Linde Co. division expects its new Pueblo, Colo., acetylene plant onstream the end of April. Object: to supply acetylene to Colorado Fuel and Iron Corp.—for welding, heating, scarfing and cutting operations—and to other industries in the Rocky Mountain area. Estimated capacity: 1.2 million lbs./year.

**Titanium:** Titanium Metals Corp. of America (New York), a jointly owned subsidiary of Allegheny Ludlum Steel and National Lead, is initiating a $2-million expansion program for its Toronto, O., plant. Expected onstream in early '62, TMCA's new facility—with 55,000 sq.ft. of floor space—will produce seamless tubing and welded and redrawn tubing in diameters up to 3 in. and lengths up to 30 ft.

**Fertilizer:** California Chemical Co. (San Francisco), a Standard Oil Co. of California subsidiary, has awarded to Chemical & Industrial Corp. (Cincinnati) the contract for the third unit of its fertilizer plant being built at Fort Madison, Ia. The new unit is expected to be onstream late this year with a capacity of 600 tons/day of pelleted fertilizer.

# foreign roundup

**Rounding out the week's international news.**

**Synthetic Fiber/Brazil:** Imperial Chemical Industries (London) has granted Companhia Brasileira Rhodiaceta—a wholly owned subsidiary of the French chemical concern, Rhone-Poulenc—exclusive patent rights for production of Terylene polyester fiber in Brazil.

**Philippines:** Three Philippine firms are looking for partners to bring these investments to the islands: Philippine Investment wants to set up a 10-million-lbs./year polyethylene plant; Industrial Pioneers of the Philippines is interested in manufacture of cellulose tape; and A&R Enterprises wants to produce pharmaceutical products.

**Import, Export/Japan:** The Japanese Ministry of Finance has these figures for '60 foreign trade: chemical imports, up 11% over '59, to $265 million; chemical exports, up 5%, to $169.2 million. Major items on the incoming list: phosphate ore, salt, potassium fertilizer, medical and pharmaceutical products and tallow. Outlook for '61: imports will top the '60 mark by 20%.

PREDOMINANT FIGURE of Garza Sada empire, Don Eugenio Garza Sada (above), will turn over reins to son . . .

HEIR APPARENT, Eugenio Garza Laguera.

# The Modern Men

**One hundred and fifty miles** south of Laredo, Tex., the bustling, mountain-rimmed city of Monterrey is pushing itself through a new industrial revolution. From its traditional basic products—beer, paper, glass, iron and steel—Mexico's second-largest industrial center is moving into new fields, mostly into chemical processing.

New plants to make soda ash, nylon and fluorinated hydrocarbons are planned or under construction. Capacity of cellulose, caustic soda and chlorine is being doubled. Other new ventures, dependent on these, are on the way.

These projects all have at least two things in common: (1) they are part of the growth pattern of Monterrey—a pattern that's tied to the growth of Mexico as a whole, yet contains forces of its own; and (2) all of them are springing up under the aegis of a single Mexican family—the powerful Garza Sada clan.

**Growing Chemical Group:** It's not surprising that all of these Monterrey projects are backed by the Garza Sadas: most industry in Monterrey is. It is their money and their drive that lie behind much of the change in Monterrey's industrial personality.

The family's chemical interests in Monterrey are known informally as Grupo Quimico—the chemical group. This actually consists of six companies in which the family (principally in the person of Don Andres Sada) exerts varying degrees of control through Celulosa y Derivados, holding company for the other five.

Celulosa, the oldest member of the group—makes rayon textile yarn and tire cord with Dutch Enka know-how. Celorey produces cellophane (British Cellophane and French La Cellophane together hold a 30% interest.) Quimica Industrial de Monterrey makes sulfuric acid, sodium sulfate and carbon bisulfide. Sosa de Mexico (in which Olin Mathieson has 20% interest) makes caustic soda, chlorine, hydrochloric acid and sodium hypochlorite.

The group's two latest projects are its biggest. Fibras Quimicas, with 40% Dutch Enka capital, is slated to start producing nylon-6 this year for textiles and tire cord in a new, $10-million plant.

This project has led the group into caprolactam production. Celulosa and two other Mexican nylon producers—Celanese Mexicana and Nylon de Mexico—have formed a joint, $10-million venture to make caprolactam from phenol and ammonia produced by the government's plants in Minatitlan. The organization is called Cicloamidas S.A. Initial production is set at 10,000 tons/year—enough to fill the Mexican market, with some left over for export.

In the other new project, Quimobasicos, the group has joined with Allied Chemical (49% interest) to build a $2-million carbon tetrachloride, hydrofluoric acid and fluorinated hydrocarbon plant, racing to get into production before the plant backed by Stauffer, Pennsalt and Du Pont gets onstream.

Grupo Quimico is Monterrey's largest and fastest-growing chemical-producing complex. It was started in '46, when Celulosa was formed, with Garza Sada capital and the know-how of two young chemical engineers—Miguel

# of Old Monterrey

Arce and Indalecio Gonzalez. Arce is technical operations chief for all group plants, while Gonzalez is head of Celulosa. Both men are now in their early 40s.

The group now employs 1,500 and by U.S. standards the operation is small—total sales are about $12 million/-year. But by '62 sales will likely reach $25 million. Besides the new ventures, cellophane production is currently being doubled, and caustic-chlorine capacity is also being doubled, to 70 tons/day.

Through Industria del Alkali (a Monterrey company in which Don Andres Sada is the biggest stockholder and in which Celulosa and a string of other Garza Sada family companies have interests) the group will have a share in what may be the biggest single new company in Monterrey.

Industria has found rich salt mines outside Monterrey. The area also is rich in limestone. With these raw materials, Industria is working out a deal with Allied Chemical to build a $20-million, 90-100,000-tons/year Solvay-process soda ash plant in Monterrey. Industria would hold two-thirds interest. Much of the soda output would go to Garza Sada family companies, mainly to Vidriera Monterrey, which owns the biggest glass companies in Mexico. As a sideline, Industria will sell salt to the group, and, in turn, the group's Soda de Mexico will supply Industria with sulfuric acid.

**Big Spread:** Actually, the chemical group is the youngest and smallest of the Garza Sada family's vast holdings. With "interests" (some minor) in more than 100 enterprises, the family's holdings collectively represent the largest private industrial combine in Mexico, with total yearly sales estimated at $300 million. There are 25,000 employees in the major holdings—beer, glass, chemicals—and some 10,000 more in companies that have Garza Sada partnerships or "interests." The Garza Sadas also have their own banks.

The beer group is largest. It comprises 35 companies, including malt, steel, packaging and paper companies, accounts for sales of some $110 million/year.

The empire is mostly an informal conglomeration of enterprises owned and run by several branches of the family, a crazy-quilt of financial cross-ties whose complexity remains a mystery to outsiders. Chemical process industries are scattered throughout this empire.

**Based on Beer:** In a very literal sense the history of the Garza Sada industrial empire is the history of modern industrial Monterrey.

Since its founding in the 16th century, Monterrey had been a pass town on the north-south and east-west routes through the mountains. Because of the heavy mining in northern Mexico, Monterrey became a milling center. When a local merchant, Isaac Garza, started making beer there in 1890, he started his family on the way to a fortune and Monterrey on the way to the modern industrial age.

From his first brewery—still standing at the center of the beer group's industrial complex—spread a chain of companies and a pile of capital that was to finance the

FUTURE STEEL CHIEF, 30-year-old Bernardo Garza Sada, now runs plants. He was educated in this country, at MIT.

COMPLEX around brewery makes paper, bottle caps.

ENGINEERS Gonzalez and Arce run chemical group.

MODERN SPIRIT of Monterrey's industrial community is reflected in architecture of downtown business section.

majority of the Monterrey community's big factories.

With supplies skimpy and unsure, the Garza Sada family found that it had to push more and more into other industries to keep itself supplied.

In 1910, these beer barons started making their own glass and bottles; in '30 they started up a paper mill for making cardboard boxes; bottle caps followed; then, in '42, a bigger paper mill combine and a steel mill were started; in '45 it was tinplate; in '58, sponge iron—to supply the sheet steel mill.

As the family holdings grew, plants were handed to offspring and relatives to run, complementing or feeding the basic core of beer, glass, paper and steel. Power and responsibility were spread out to sons, brothers, cousins.

In the earlier stages of its growth the family's captive market provided the basis for diversification. Now the bulk of products turned out by family plants go outside. But internal sales are still important, and the captive market still helps get new ventures off the ground—e.g., the Quimobasicos soda ash project.

All kinds of ventures are spreading out from the family tree, ranging from aluminum bottle labels to glass fiber. A notable one is Fierro Esponja, an offspring of the beer group's steel company, Hojalata y Lamina. Fierro turns out sponge iron by a direct-reduction (Hyl) process, which was developed by the group.

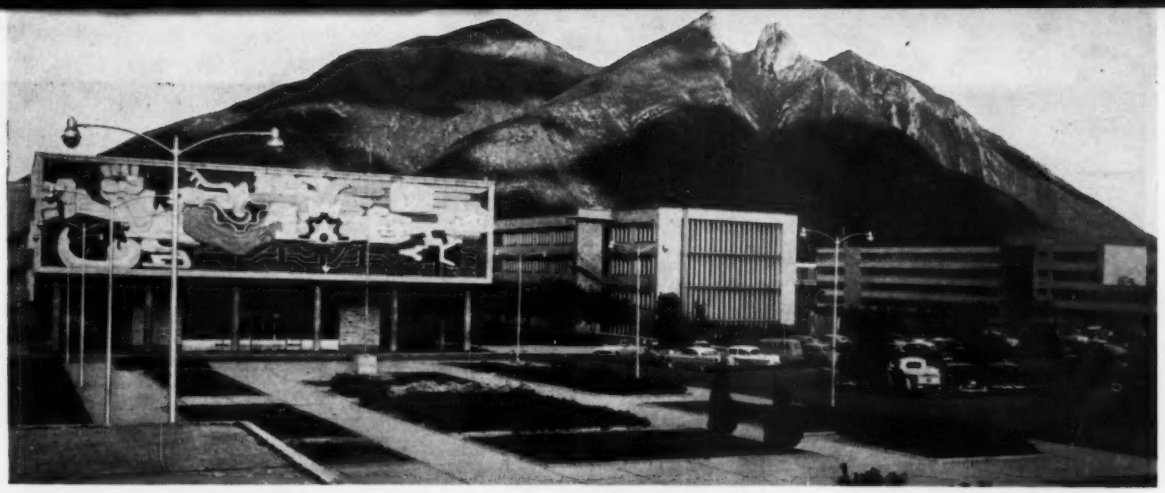
**The Old and the New:** Head man of the beer group is conservative, camera-shy Don Eugenio Garza Sada. His brother, Don Roberto, is also in the beer group, heads the steel operations. Now in his late 60s, Don Eugenio is the predominant figure in the Garza Sada family.

His cousin, Don Roberto G. Sada, heads the 30-company glass group, which owns all the major glass companies in Mexico, makes machinery for itself and the other Garza Sada groups. Also running the glass group is his brother, Andres Sada, who also heads the chemical group.

The sons of Don Eugenio and Don Roberto are being groomed as the heirs apparent of the greatest chunk of the Garza Sada empire. Don Eugenio's son, Eugenio Garza Laguera, runs the beer group's central services division, while Don Roberto's son, Bernardo Garza Sada, manages the beer group's steel operations. Both are 30, modern-management oriented, and trained in the U.S.—Eugenio at the University of Texas, Bernardo at MIT.

**Spirit of Monterrey:** If the history of the Garza Sadas embodies the history of Monterrey, the personality of the family's leading figures typifies the spirit of the city's business community.

RAGGED EDGES of community's prosperity—over-all economic conditions are good by Mexican standards—are apparent a few minutes away from modern downtown area.



TECHNICAL INSTITUTE was financed by local industry, epitomizes spirit of technical advancement, independence.

The Monterrey businessman likes to think of himself as a unique breed among Mexican businessmen. "We did it," he likes to say. "The government didn't give us any handouts."

Concerned over the encroachment of government into areas claimed by private enterprise, the Monterrey industrialists have responded by efforts to prove that they can do the job better than the government. The main organ of this demonstration has been the Grupo Industrial, an organization of Monterrey industrialists.

The leading force in this campaign has been the Garza Sadas, chiefly in the person of Don Eugenio. The family interests were the main impetus behind Monterrey industries' having their own—nongovernment—electric power. Through Grupo Industrial, the family sponsored the idea of building a gas pipeline from Texas—a stroke that has given the city's industry a tremendous boost. Now the organization is building its own pipeline to carry water from La Boca dam in the nearby mountains.

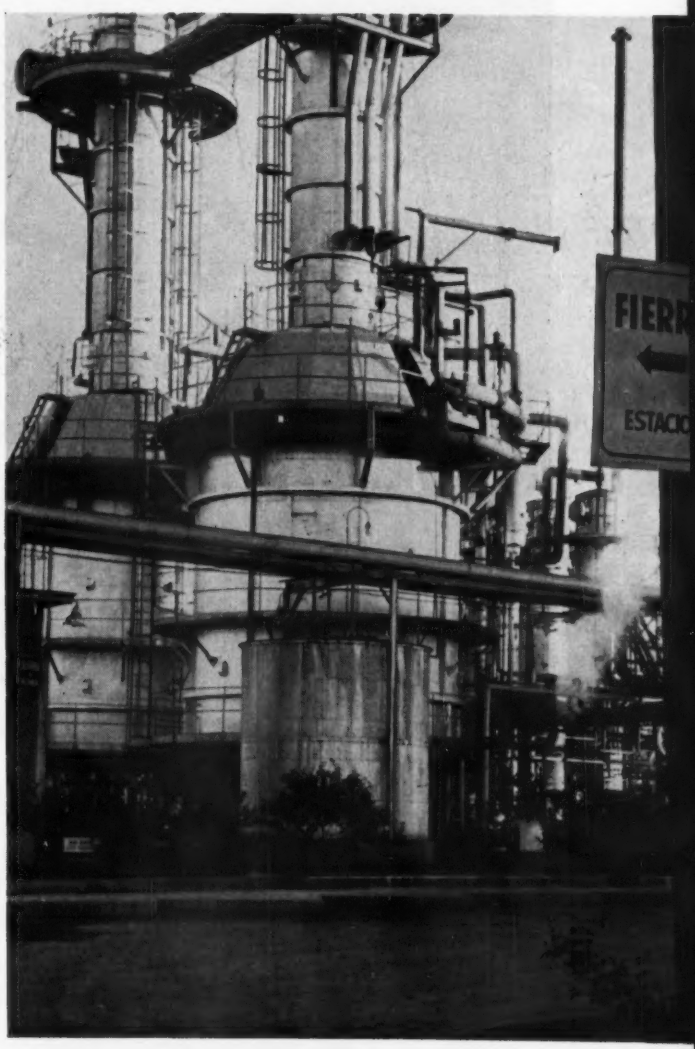
Proud of his accomplishments, the Monterrey businessman will tell you his workers have 40% greater productivity than their Mexico City cousins—whose bosses are less inclined to quibble over "interference" from the government. He claims that his "group"-owned electric company can make a profit and sell its power for less than the government utilities, that his steel company makes considerably higher profits than the government's.

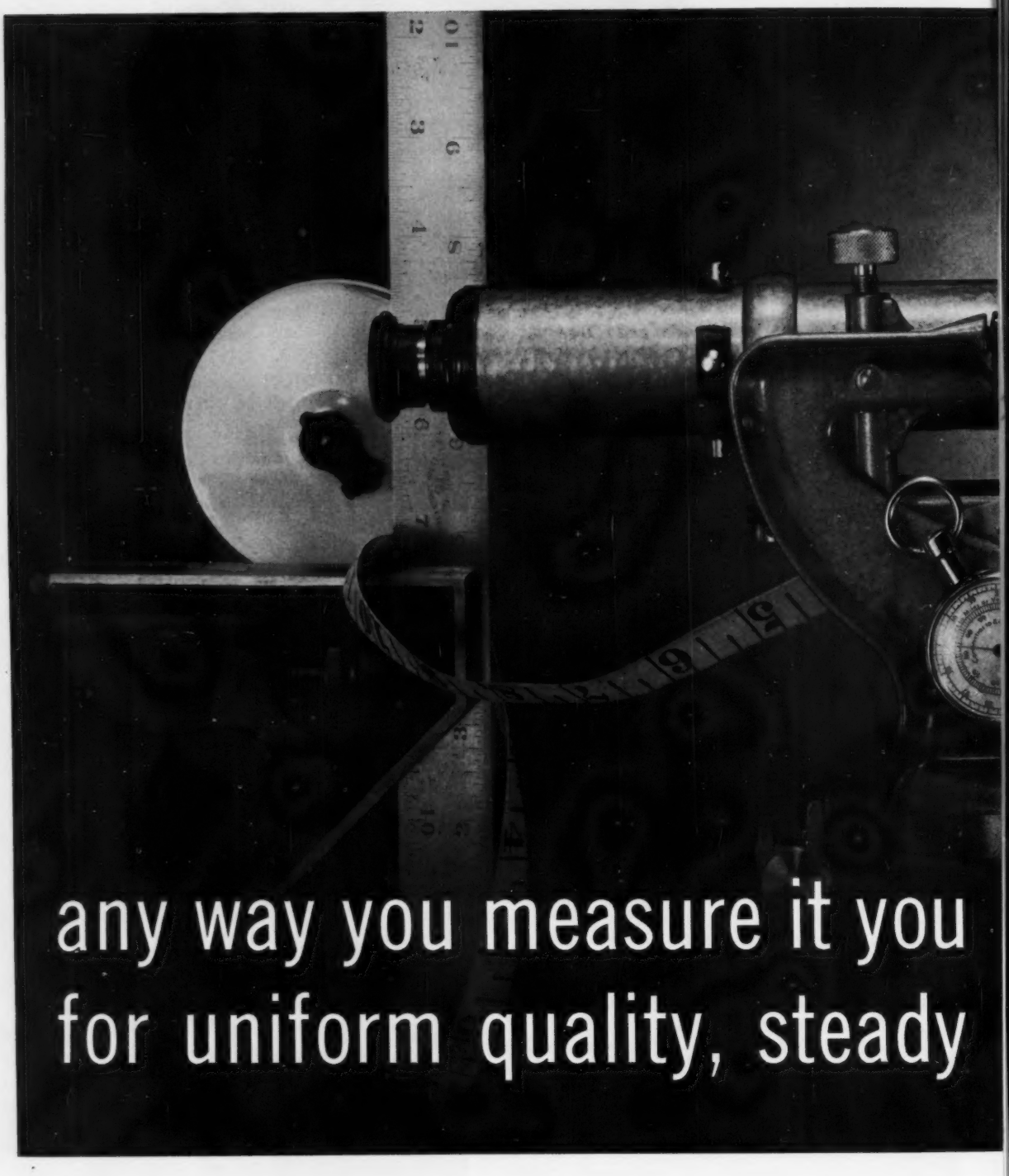
Monterrey's closeness to the U.S. has helped develop in its businessmen their combination of Mexican national pride and the U.S.-styled business philosophy of private enterprise and technical advancement.

Local industry built and paid for Monterrey's $5-million Technical Institute, modeled after MIT—alma mater of the Mexican institution's chief founder, Don Eugenio Garza Sada. Some 3,000 students (300 foreign) go to the institute, along with company men taking short management courses. It's considered the finest institution of its kind in Latin America. One segment, the Institute of Industrial Investigation, forms an important link with U.S. technology. It's patterned after the Southwest Research Institute of San Antonio, which helped set it up and which still has strong ties.

**Operation Bootstrap:** Monterrey's industrial growth has been largely a bootstrap process. "There is no real reason for this city being here," says Institute President Fernando Garcia Roel. The climate is bad, there's not enough water and no fuel resources in the area. It took people like the Garza Sadas to make it grow.

SPONGE IRON plant at Garza Sada Hojalata Lamina complex uses company-developed direct reduction process.



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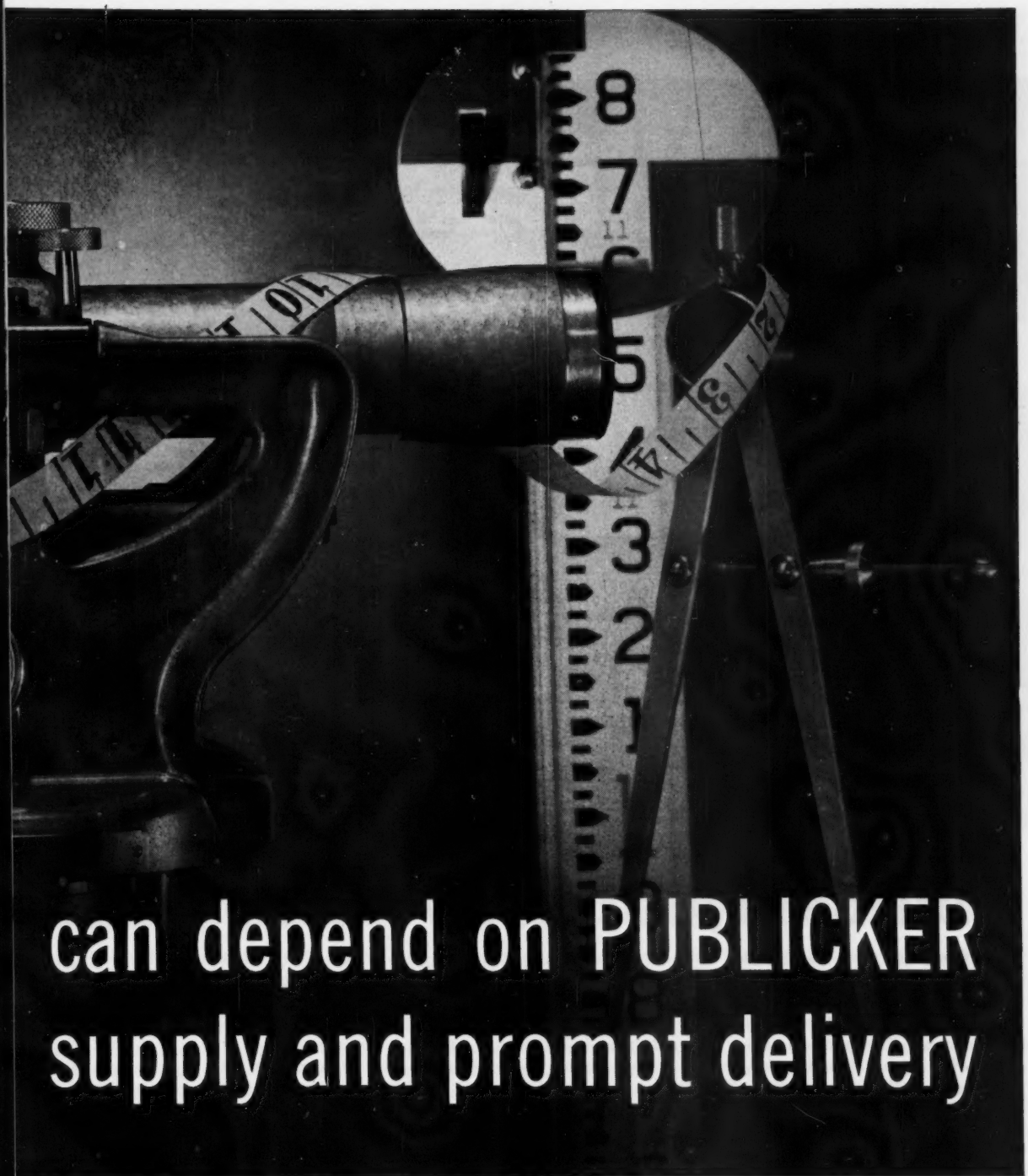

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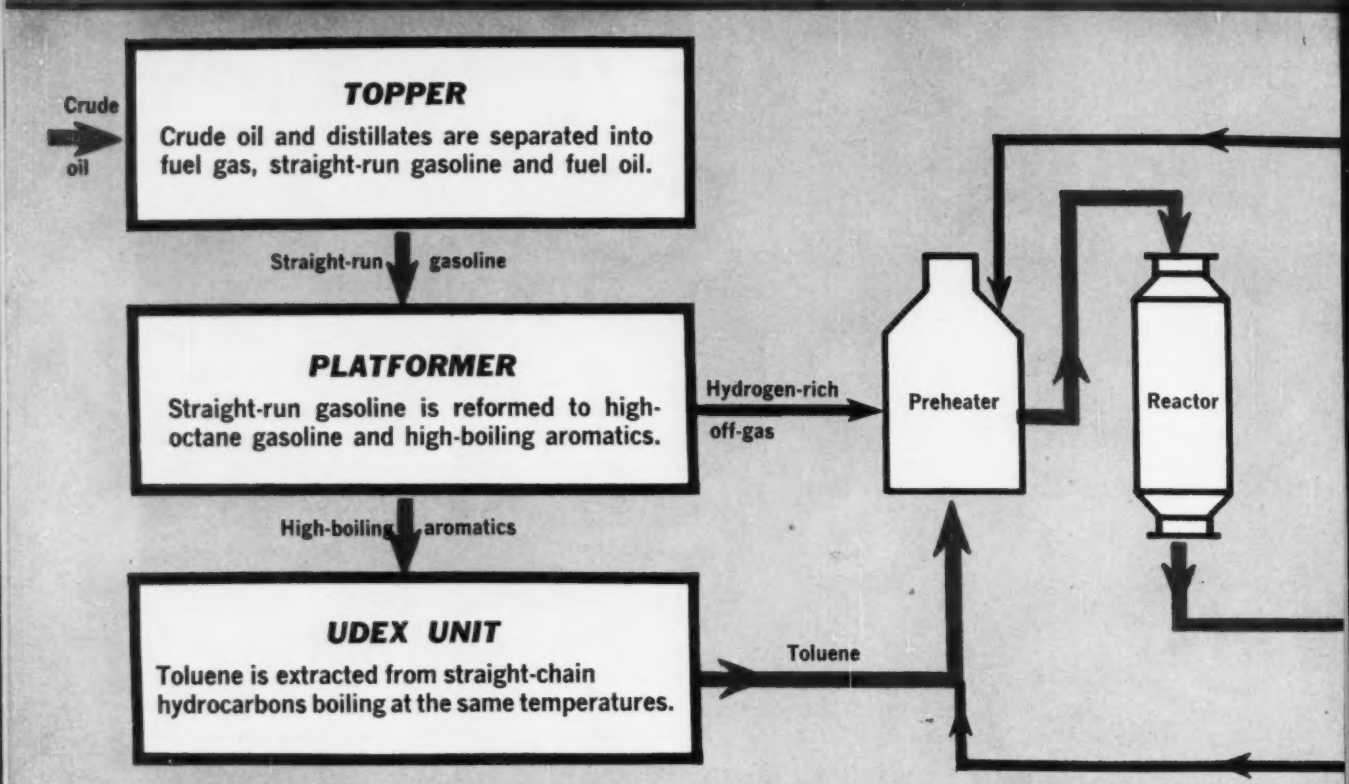
## How Hydrodealkylation Extends the




# Inside Hydeal: How Carbon-Atom

**The flowsheet and photograph** (*above*) depict a hydrodealkylation plant, a new unit destined to become a fixture on many chemical plant and oil refinery sites. This particular unit is Signal Oil Co.'s (Houston, Tex.) Hydeal benzene unit, the first hydrodealkylation process to achieve operation at design rates (*CW, March 4, p. 46*). But Suntide Refining Co. (Corpus Christi, Tex.) has just put its Hydeal plant onstream; and Sunray Mid-Continent Oil Co. (Tulsa, Okla.) is readying a Hydeal plant.

All together, 11 Hydeal units have been spoken for by an equal number of companies. Universal Oil Products Co. (Des Plaines, Ill.) is licensor of the process. And other hydrodealkylation processes have recently arrived on the scene or are under development.

All of these methods have the same objective: economical production of benzene and naphthalene from their alkylated derivatives. Simple marketing economics pointed Signal Oil toward hydrodealkylation. Last July the company found itself with a surfeit of toluene, hard to sell at 19¢/gal. At the same time, customers were clamoring for benzene, at 34¢/gal. Signal knew that toluene could be dealkylated to benzene. The problem was to get an economical process.

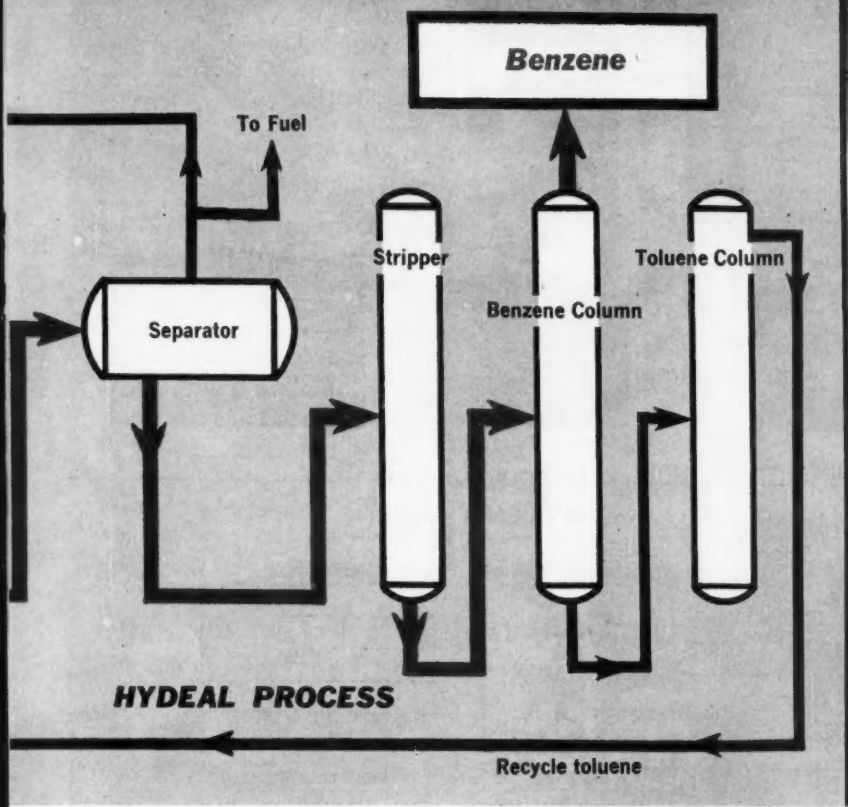
Benzene was selling at 15¢/gal. more than toluene, but 1 gal. of toluene will yield only about 0.8 gal. of benzene. This volume shrinkage brings the price differential down to 12¢/gal., the maximum cost Signal could afford in converting toluene into benzene.

In August, Signal got together with UOP and Ashland Oil & Refining Co. (Ashland, Ky.), codeveloper (with UOP) of Hydeal. Later that month, Signal signed up two customers, who would take the total output of a not-yet-built 1,000-bbls./day benzene unit.

Procon, Inc., the engineering and construction subsidiary of UOP, began work in September. And on Jan. 8, four months later, the Hydeal unit was up and making 1,000 bbls./day of benzene. UOP now estimates operating costs at 2¢/gal., exclusive of depreciation.

**Natural Fit:** As the flowsheet shows, Hydeal fits neatly into Signal's operations. Starting with 60,000 bbls./day of crude oil and distillate, the processing scheme flows through three major units to Hydeal. A topping unit makes straight-run gasoline from the crude. This gasoline is reformed in a Platformer from which hydrocarbons pass into two Udex units. Here the toluene

## Petrochemicals Processing Chain



At Signal Oil's Hydeal unit: reactor (left), preheater (foreground).

# Clipper Boosts Aromatics Profits

(and xylene) for hydrodealkylation is made. Another Udex unit purifies benzene fractions.

But the straight-through succession of units that convert crude to benzene is only part of the total integration Signal Oil has achieved. Hydeal requires hydrogen, in addition to toluene. This need is filled by the Platformer. The hydrogen moves into both the Hydeal unit and a Uniformer, which purifies it for other uses.

**How It Works:** Toluene, 1,570 bbls./day, along with hydrogen, is fed into the Hydeal unit. After preheating to reaction temperature, they are sent down a reactor containing a fixed catalyst bed. Catalyst identity is secret; but UOP does say that the catalyst can be regenerated.

How long the catalyst will function before decoking is needed is a key question in Hydeal evaluation. The answer is still some distance off, since the end of the first catalyst cycle isn't in sight.

The products of the catalytic reaction are benzene, unconverted toluene, unreacted hydrogen, and methane—the latter resulting from the combination of hydrogen with the carbon atom split from toluene's shell. This whole gaseous mixture is then sent to a separator.

Separation poses additional questions. Methane is easily removed and sent to off-gas. But three decisions concerning hydrogen must be made: (1) Should it be recycled? (2) How much should be purified? (3) How?

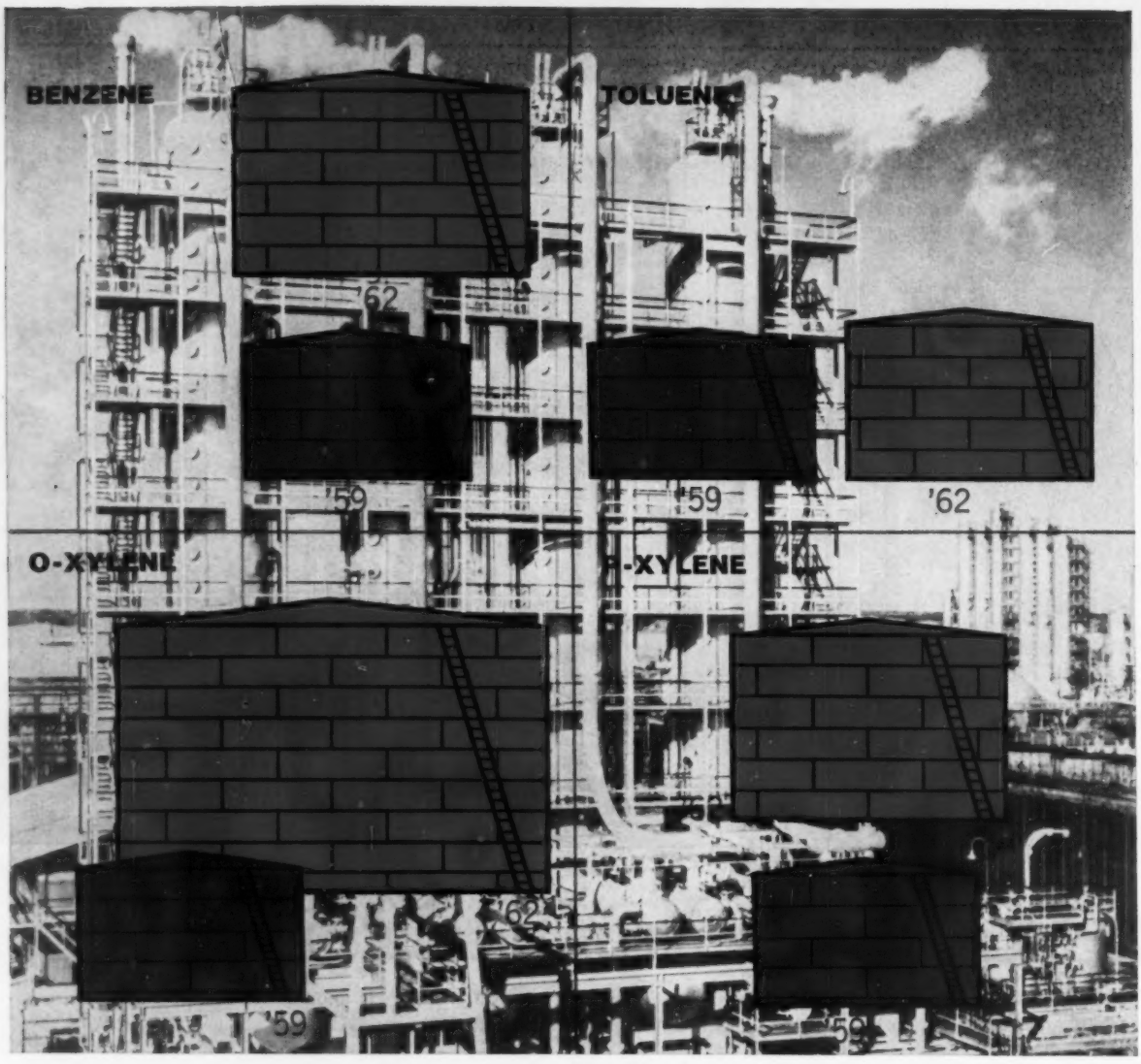
UOP, using reformer off-gas (82% hydrogen) as a source, recycles enriched hydrogen through benzene-toluene lean-oil absorption. The amount of recycle, dependent upon the hydrogen conversion per pass in the reactor, is another secret of the process.

Alternate schemes for purifying the hydrogen include the packaged molecular sieve offered by Linde Co., a division of Union Carbide Corp. Other possibilities: low-temperature distillation and carbon-black adsorption.

After separation, in which toluene and benzene are condensed to the liquid state, the process stream moves through a set of towers. Here the benzene is clay-treated to meet color specifications, then recovered. Toluene is separated out and recycled.

Recycle is another key step. Hydeal gives a toluene-into-benzene conversion per pass of 70-80%. The higher the conversion, the lower the over-all yield. Yield can be calculated by taking UOP's figure of 1,570 bbls./day of toluene required for 1,000 bbls./day of benzene. When the volume

# WHAT'S NEWS IN ENJAY SUPPLY

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| | CAPACITY 1959 | 1962 |
|---|---|---|
| BENZENE million gal/yr | 45 | 79 |
| TOLUENE million gal/yr | 32 | 55 |
| ORTHOXYLENE million gal/yr | 6 | 24 |
| PARAXYLENE million lb/yr | 65 | 105 |

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loss is included (1 gal. of toluene makes only about 0.8 gal. of benzene), the yield comes to 88%.

Signal Oil uses toluene in its Hydeal operation. But it could feed xylene or other heavy aromatic hydrocarbons to the same unit and still produce benzene. And by slightly modifying the process, it could break naphthalene-based aromatics down to naphthalene.

**In the Race:** At least two other process design firms—Houdry Process Corp. (Philadelphia) and Hydrocarbon Research, Inc. (New York)—are offering hydrodealkylation processes.

Besides hydrodealkylation, moreover, oil refiners may soon get another powerful chemical-processing weapon. Universal Oil Products has applied for an Australian patent (Application No. 60,757) on an "Alkylation-Transalkylation Process." This system would accomplish the reverse of dealkylation, make toluene from benzene, for example.

If the predicted benzene glut (*CW, Feb. 25, p. 21*) becomes a reality, this process would be much in demand. Even without overproduction, an alkylation process would give refiners great new flexibility. It would mean that refiners could go either way; take whatever in crudes, either alkylated or dealkylated compounds, and make whatever the market demands.

Right now, the spotlight is on dealkylation. UOP leads the field. The industry will have to wait until July to see a competitive process—Houdry's —in commercial operation.

Upgrading toluene, now 25¢/gal., to a 34¢/gal. material for only 2-5¢ total cost is a hard-to-resist proposition. With 15 firms now moving into the field, hydroalkylation is clearly here to stay.

The future of the process, however, is intimately tied to the market outlook. By '65 U.S. demand for benzene will climb to 600-650 million gal./year. Foreign markets will take 50-100 million gal./year in '65, according to estimates. Already, present and planned capacity for U.S. benzene totals 800 million gal./year.

And the naphthalene story is much the same. Construction will add about 300 million lbs./year to capacity. Right now hydrodealkylation is hot. But the outlook is studded with question marks.


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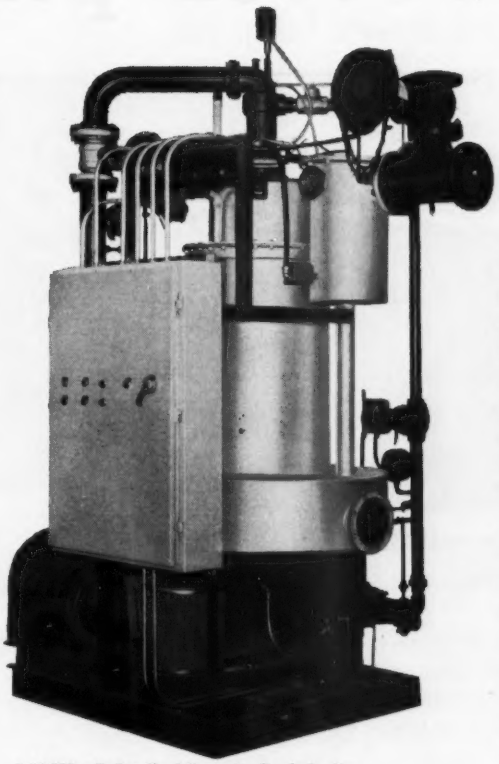
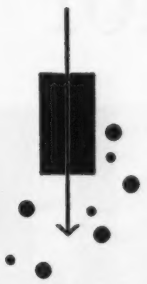
THERMAL utilizes unique principles of design to provide refineries, chemical processors, metallurgical plants, and other industrial users with a source of inert or purge gases that is compact in size and provides high outputs for low initial cost. Standard outputs range from 2,000 scfh to 60,000 scfh.



A 30,000 scfh Gas Fired Generator Ready for Use



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## Bagging the Smoke

**Smoke from one** of Bethlehem Steel's South San Francisco open-hearth furnaces is scheduled to be eliminated soon by a dust-control technique dubbed "nonshaking bag house." The installation, resembling a giant carpet sweeper, will collect some 75 lbs./hour of black carbon, white lime, and red iron ore dusts.

Depending on special high-temperature cloth-filter collectors, the bag house stems from pilot studies in cooperation by Bethlehem, U.S. Steel, Judson Steel Co., and Pacific States Steel Co. It's an effort to bypass more costly dust-collecting systems that use electrostatic precipitators. Although the bag-house installation cost is about $250,000 for each open-hearth furnace, officials say that its successful application can save almost $1 million in the San Francisco Bay area alone. The drive behind dust control comes from antismog regulations in the California and Pittsburgh areas.

## Packaged Hydrogen

**Chemical processors** using high-purity hydrogen can now obtain a new packaged generator—said to use a special steam-reinforcing process—from its developer, Selas Corp. of America (Dresher, Pa.).

The units are standardized; they come in various sizes designed to handle capacity ranges from 50,000 to 1 million standard cubic feet per day. Hydrogen purities vary from 98% to 99.999%, depending on choice of purification steps.

Key of the unit's process is a special reforming furnace developed by Selas. In the process, the natural gas or propane is fed through a desulfurizer; it's then mixed with steam, brought up to temperature through heat exchange, and fed to the reforming furnace. The furnace effluent, containing hydrogen, carbon monoxide, carbon dioxide and methane, is mixed with additional steam and sent to a conventional shift converter, which reacts the added steam with the carbon monoxide to make more hydrogen and carbon dioxide. Then excess steam is condensed, and the water knocked out in a mist extractor.

Crude hydrogen exiting from the mist extractor can be purified via three processing routes, depending on

chemical processors!

no capital investment for an over-the-fence oxygen plant built with

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CERTAINTY that your final cost of oxygen will not be upped from the original estimate. CERTAINTY that your cost over the contract period will be as low as possible, in keeping with requirements for purity and trouble-free operation . . . the result of LINDE's advanced engineering features.

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Test tube on the left contains a mixture of polyvinyl acetate and hydrocarbon resin which have been hot melted together. They are obviously highly incompatible.

Test tube on the right contains the same incompatible mix, except that a quantity of Nevillac was added to the melt. They are now clearly compatible.

# Nevillac® makes friends out of enemies in adhesive formulations

Among the merits of Nevillac, Neville Chemical Company's hydroxy resin, is its value as an essential ingredient in adhesive formulations. It is effectively used in several other areas in addition to adhesives. Because it is so highly compatible and soluble itself, it acts as an effective agent for bringing normally unfriendly materials together in solution. This co-compatibilizing and natural solubilizing characteristic is realized in its use with most elastomers, plasticizers, solvents and other resins. But these are not the only good reasons for using Nevillac.

Nevillac also possesses an inherent ability to increase the tack and bond of adhesives to which it has been added. It is effective in lowering the molten viscosity of adhesive formulations and it accentuates resistance to water and alkali. Other Nevillac characteristics are generally good light stability, permanent thermoplasticity and ease of emulsification. It can be appropriately used in cold cut, hot melt or latex blended formulations.

It is also used in the compounding of printing inks, lacquers, coatings, waxes, polishes and rubber, to name a few. You'll find it will pay to investigate Nevillac for your products. Write for further information.

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purity required. Purities of 98-99.5% can be achieved through single-stage, regenerative, molecular sieve adsorption. Adding a second adsorption stage raises purity to 99.5-99.98%, and adding a microfilter diffusion step between the adsorption stages brings purity to 99.999%.

In a typical unit the utilities required to produce 1,000 standard cu. ft. of hydrogen (at 90 lbs./sq.in. gauge, and 100 F) are: propane, 3.01 gal.; steam, 104 lbs.; fuel gas, 225 standard cu.ft.; cooling water, 960 gal.; electricity, 3.5 kw.

## Phosphate Patents

**Two patents** were recently granted for new diammonium phosphate processes. The first (U.S. No. 2,963,359) was issued to U.S. Phosphoric Products, a division of Tennessee Corp. (Atlanta, Ga.). In the process, a rotating bed of diammonium phosphate serves as a medium for neutralizing wet-process phosphoric acid by anhydrous ammonia. The phosphoric acid is sprayed onto the top of the bed while the ammonia moves up from beneath. This bed is contained in a drum, described as unique because it serves as a neutralization vessel, mixer, granulator and partial dryer. Product is screened off the drum and sent on for final drying.

The second patent (Australian No. 59,982/60) seeks to overcome a disadvantage inherent in foreign diammonium phosphate processes. Woodall-Duckham Construction Co. Ltd. (London) has come up with a method of operating a coke-oven by-product plant using indirect ammonia recovery — keeping the still temperature low enough to prevent diammonium phosphate decomposition.

## PROCESSES

**Waste Control:** Automatic control of detergent wastes in discharged water is claimed possible with an automatic purifying process developed by Bruner Corp. (Milwaukee, Wis.). The unit, called Brunerclear, is designed for coin laundries. It uses undisclosed chemical coagulant followed by a clarifier and a settling tank.

It's said to reduce turbidity to less than five parts per million, detergent levels to one part per million. Oper-

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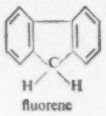
Above is the basic message. Oh, there are details that can be spun out . . .

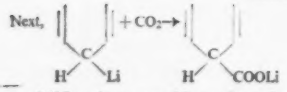
## Reagent to identify alkyl halides

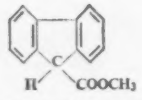
Eastman 8164 Methyl Fluorene-9-carboxylate 5 grams $5.00

For many years we have been hiring chemistry graduate students for summer jobs. It gives them a chance to look us over and vice versa. Some of the biggest wheels in the corporation came that way. Others found three months of estival service to mammon sufficient for a lifetime and have become famous professors of chemistry. Still others have slipped through our fingers to become wheels in other companies. (You can't win them all.)

This compound represents a week's work last summer by one of these young men. The man he was hired to assist specializes in organometallic reactions. The mentor found a lithium reaction to give him (from the April 1960 *Analytical Chemistry* on page 554). The summer man reacted lithium wire with bromobenzene to produce phenyllithium. He used this to replace one of the central hydrogens in  by lithium.

fluorene




On acidification, an H replaced the Li. He then esterified with methanol, with HCl as catalyst. His product, 

was good enough to overcome the skepticism of our genial but skeptical chief control chemist.

Nobody patted him on the head for his accomplishment. All he accomplished was to make it unnecessary for other chemists who look up the *Anal. Chem.* reference to spend a week of their own time preparing the reagent that has been found to react with a wide variety of alkyl halides to yield sharp-melting derivatives. Since such reagents are few and far between, you may even wish to send for a procedural abstract. Or for an employment application form.

## A holding jig for amino acids

Eastman 7819 p-Nitrobenzyl Chloroformate 5 grams $3.30

For about 30 years, when chemists in their crude way have tried to couple amino acids together, they have used a "carbobenzoxy" group ($C_6H_5CH_2OCO$-) to cap off the amino group of one amino acid while preparing the carboxyl end of the acid for the coupling reaction. These "carbobenzoxy" derivatives of amino acids are oily things. More recently (*J.A.C.S.*, *74*, 3818 [1952] ) it has been found that with a nitro group in p- position on the ring you get stable crystalline derivatives instead of oil. It is time to make known that Eastman 7819 is the proper nitro reagent. p-Nitrobenzyloxycarbonyl derivatives of the 19 common amino acids can be prepared. (Because of the nitro group these derivatives can be detected in very small amounts by spectrophotometry at 265m$\mu$.)

In the presence of a base to take up the HCl released, you condense the reagent with your amino acid. Then you can convert the product to an acid chloride and react it with the methyl ester of another amino acid. Saponify the resulting ester and remove the carbo-p-nitrobenzyloxy group by hydrolysis. Bench chemistry is crude indeed by comparison with cell chemistry. Nevertheless, the reagent is selling rather well. We make it by reacting pure p-nitrobenzyl alcohol with phosgene in dioxane as solvent. Whether we have ever lost any production through the splitting off of $CO_2$ from the product to leave nothing but p-nitrobenzyl chloride, we are not saying.

## For the carriage trade

Eastman 2313 Benzenesulfonic Acid 500 grams $14.25

Until now we have always felt constrained to put a "P" for Practical or a "T" for Technical in front of "2313." Now there is a prefixless Eastman Grade. Worst metal contaminant left is Fe at 0.3 p.p.m. Used to be that nobody felt that deeply about purity in benzenesulfonic acid, but with the generally rising taste for luxury there are now some who do.

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ating costs are about 2¢/washer load for standard automatic washers; installed costs are $7,500-8,500, depending on the number of washing machines.

Tests by state officials in Florida, Michigan, New Jersey and New York have shown that the abundance of detergents in waste waters poses a mounting threat to drinking water supplies, sewage treatment and stream life. The detergents travel far underground, cause offensive taste.

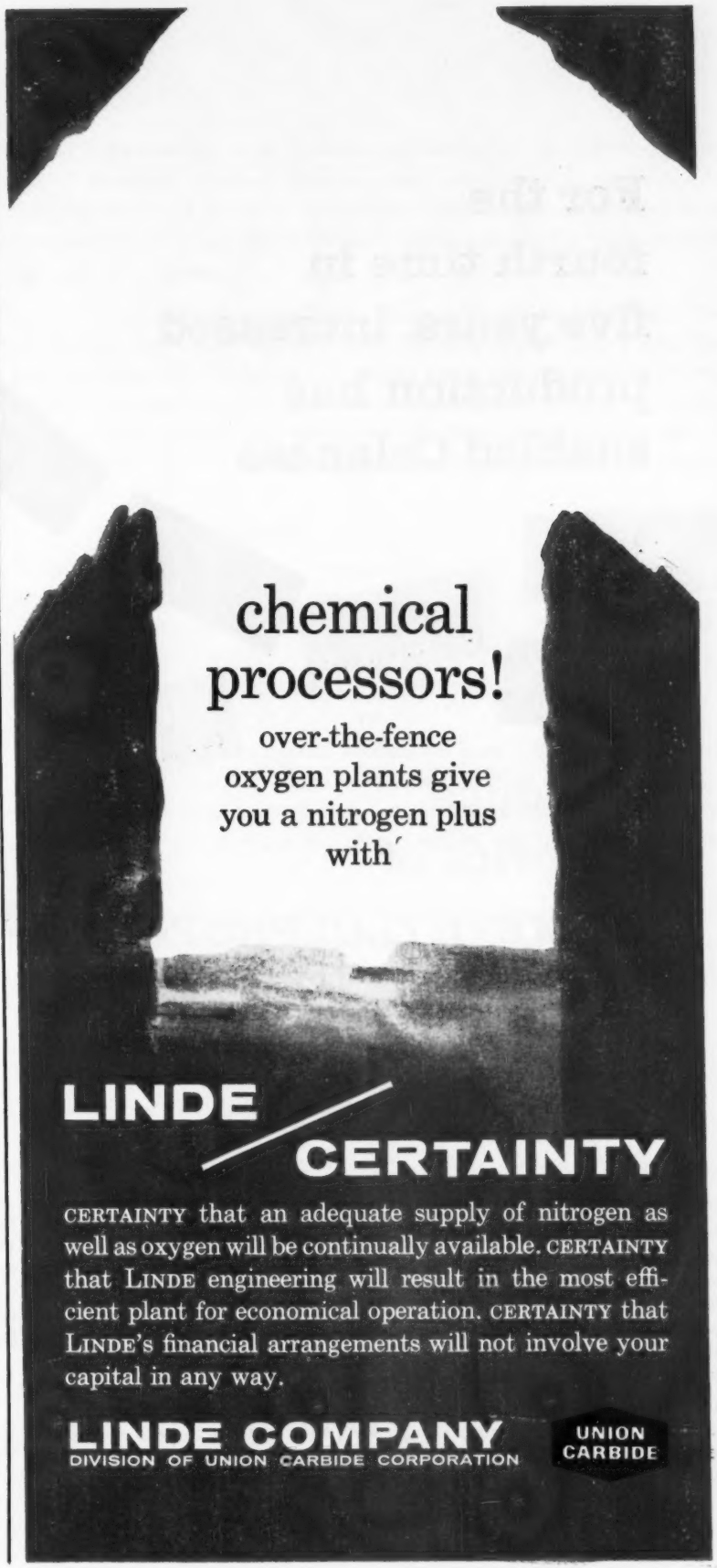
•

**Short-Cut Vinyl Chloride:** Hungarian engineers have reported on a pilot process that yields a polymer-grade vinyl chloride from gaseous mixtures containing as low as 8% acetylene, thus bypassing the tricky enrichment step required when acetylene is made by partial-oxidation methods. Key is said to be a mercuric chloride catalyst on a support of activated charcoal, with either barium chloride or titanium dioxide as a promoter.

In the process, a gas made up to simulate gas coming out of a partial-oxidation reactor (containing 8% acetylene, 25% carbon monoxide, 4% carbon dioxide, 53% hydrogen, 1% air, 9% hydrogen chloride) was fed to a reaction tube fitted with a heating jacket. Analyses of the effluent gases showed no composition change in carbon monoxide, carbon dioxide and hydrogen. Yields of vinyl chloride at 356 F were in the range 80-99% at space velocities of 12.9-6.4 cu.ft./hour over the barium chloride promoted catalyst; and 87-100% at space velocities of 12.9-3.2 cu.ft./hour were the values over the titanium promoted catalyst. G. Thurzo, of the Budapest Research Institute for the Industry of Organic and Synthetic Materials, reported the process.

•

**New Resin:** A new urethane resin, tradenamed Texin by its developer, Mobay Chemical Co. (Pittsburgh), reportedly can be molded in conventional plant equipment to yield a product possessing properties identical to cast-urethane elastomers. Right now, production of urethane elastomer products requires a costly, time-consuming liquid casting. With Texin, molders and extruders will reportedly be able to cut part-forming from hours to seconds and thus achieve mass production.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Celanese trimethylolpropane—the ideal intermediate for producing urethane foams and coatings, and alkyd resins—is now available at the lowest price in its history: *30.5¢ per pound.* That means you can get all the many advantages of trimethylolpropane—and save money at the same time.

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# Washington
## Newsletter

CHEMICAL WEEK
March 18, 1961

**Revaluation of the German mark will have a limited effect,** if any, on U.S. chemical exports to Europe, report government economists. West Germany increased the value of the mark 5% and the slight boost is not expected to alter greatly the enviable competitive position of German chemicals and other goods.

Government trade officials believe a 10 or 20% hike in the value of the mark would have had significant consequences. In such a case, German chemicals shipped to the U.S. would have risen substantially in price and the domestic industry would have received a shot in the arm. As it is, however, they expect at least part of the 5% rise to be absorbed by German manufacturers, so that the price of West German products will not increase appreciably.

The over-all outlook, most agree, is for a very slight increase in German prices and perhaps a corresponding slight rise in U.S. exports. It is not expected, however, to make up for the recent leveling off of U.S. chemical exports, which hit a high of $457 million in the second quarter of '60 but declined slightly to $429 million in the third quarter and $419 million in the last three months.

•

**A pattern of identical bidding on rock salt contracts** has been broken by the District of Columbia. District Procurement Officer Rexford G. Wessells last week rejected four bids because three were identical and the fourth was only a shade different. Then he told the local newspapers about it.

The publicity prompted a fifth firm to submit an offer, far under those of the other four. The new bidder, whose name was not disclosed, wants 30 days to firm its offer. Wessells is going along, postponing for a month his original plan to readvertise for new bids.

It was the fourth straight year the District had received rock salt bids that were similar, if not identical. The same pattern has been noted in cement bids, now under investigation by a grand jury.

•

**Drug and chemical wholesalers report sales and inventory rises** in Jan. '61, both higher than in Dec. '60 and Jan. '60. The latest survey by the Commerce Dept. shows increases in all categories except paints and varnishes.

January sales by drug, chemical and allied products wholesalers rose 4% over Dec. '60 and 3% over Jan. '60. Inventories were 1% above Dec. '60, and 5% above Jan. '60. Estimated sales in January were $383 million, compared with $367 million in December and $372 million a year earlier.

The largest sales increase, by far, was reported by wholesalers of industrial chemicals and explosives—an 11% rise over Dec. '60 and

9% over Jan. '60. Sales of drug wholesalers rose 2%, both in the month and the year; while sales by paint and varnish wholesalers remained steady between December and January but declined 4% from Jan. '60.

•

**Wider use of new chemical and plastic products** and other techniques, including use of adhesives, is what President Kennedy has in mind for his new housing program. His goal is to make low-cost housing available to low-income families; obviously, new materials and construction techniques must be found.

In his housing message to Congress last week, Kennedy said that among the problems most in need of research and experimentation are "ways to improve technology of homebuilding and thus make better homes available at lower cost." He wants Congressional authority for federal housing agencies to help finance tests and demonstrations on new products and new approaches to home design and construction.

•

**No opposition to Paul Rand Dixon** came up at hearings this week when the Senate Interstate & Foreign Commerce Committee considered his nomination as chairman of the Federal Trade Commission.

As chief counsel of Senator Kefauver's Senate Antitrust & Monopoly Subcommittee, he directed the investigation of pharmaceutical price structures. As FTC chairman, he will be in a position to continue this line of attack to even better advantage. Dixon will replace Earl W. Kintner.

•

**Hearings on counterfeit drugs,** scheduled to start March 21 (*CW Washington Newsletter, March 11*), have been postponed by Senator Kefauver. He says the Senate Antitrust and Monopoly Subcommittee hearings will be rescheduled after the subcommittee staff has evaluated results of a full-scale investigation of drug counterfeiting, conducted by the Food & Drug Administration.

•

**The Federal Office of Saline Water has a new director.** Named to the post by Interior Secretary Stewart L. Udall is 42-year-old C. Frederic MacGowan, an engineer with a labor union background. He succeeds Dr. A. L. Miller, former Republican congressman who was named to the office in '58.

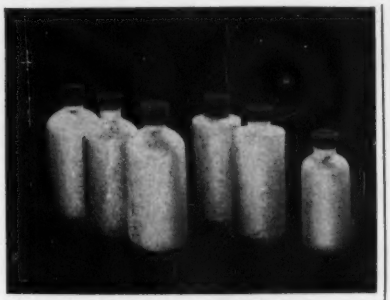
MacGowan is a graduate engineer with considerable experience in industrial engineering methods. Since '54, he has been technical advisor and international representative for the International Brotherhood of Boiler Makers and has spent much of his time working on atomic energy developments.

Udall, in announcing the MacGowan appointment, predicted that the saline-water program would be speeded and will take new directions. One such move may be reinstatement of the joint Atomic Energy Commission-Interior Dept. program to use an experimental process-heat nuclear reactor for desalinization work.

ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared by U. S. Industrial Chemicals Co.*

# U.S.I. CHEMICAL NEWS

March 25 ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1961



New textured metal coat for polyethylene squeeze bottles comes in range of colors.

## Polyethylene Squeeze Bottles Get Metal Coat By New Vacuum Process

A new, modified vacuum-coating process for polyethylene squeeze bottles is claimed to produce adherent, textured metallic finishes in a choice of colors. Coatings applied by the new process are reported to stay on the bottle after many squeezings. The textured effect, which can be varied, is designed to eliminate glare and gaudy appearance, and to hide finger prints or other soiling. This surface takes printing without additional treatment.

Another advantage claimed for the process is that it tends to seal the polyethylene, and slow down the rate at which solvents and volatiles attack it or escape. Tests by the developer are said to indicate no measurable loss of either isopropanol or lube oil after a month in the finished bottles. Nor did these materials cause breakdown of the coated surface.

The process is being recommended for cosmetic containers, toys, etc. and is reported to be competitive on cost with ordinary vacuum metallizing of plastics.

## *Need for Vitamin E Found To Rise with Intake of Unsaturated Fatty Acids*

Recent investigations have been conducted on the relation between unsaturated fatty acids in the diet and the body requirement for tocopherol (vitamin E). Results indicate that, although an intake of 5 mg per day of $\alpha$-tocopherol may be enough for an adult having low stores of linoleic acid, intake of large amounts of vegetable oil over long periods can up this requirement to 30 mg per day.

MORE

# Titanium Now Competes on Cost, For Fabricating CPI Equipment

### Market for Titanium Going Up Because of Lower Prices, Stepped-Up National Defense Program

Titanium producers are now bidding for CPI equipment jobs on a cost and performance basis against common construction materials such as lead, copper, stainless steel and special nickel alloys. They believe it is no longer necessary to compete on long life alone, because titanium sponge now sells for $1.60 per pound (against $2.75 in early 1957). Thus, titanium's desirable properties, other than corrosion resistance, are now important sales advantages.

Equally important, fabricators are now more familiar with the working characteristics of the metal. Many of them have developed cost- and trouble-saving techniques for welding and other fabrication operations.

#### Titanium Heater Coils

For example, a recent report states that titanium heater coils are now being fabricated for sulfuric acid—metallic sulfate service in metals production. Here, titanium's ability to shed corrosion products, rather than its corrosion resistance, was the reason for its selection. In this environment, corrosion products evidently build up on coils and cut heat transfer rate. In contrast to the material previously used for these coils, the titanium is said to shed corrosion products when tanks are simply flushed with boiling water. No scrapping, chipping, or brushing is needed.

MORE

Typical CPI application for titanium is this caustic scrubber column (16 in. diam., 23 ft. long). Photo courtesy Pfaudler Permutit, Inc.

## *Fuel Cell Being Developed Uses Sodium, Oxygen, $H_2O$*

According to recent reports, sodium metal is being used to fuel a new type of cell for the production of electric power. Such cells are being incorporated into a power plant prototype now under development for the Navy.

Employing the reaction of sodium with oxygen and water, these cells are claimed to have an efficiency of 60%—much higher than hydrogen—or hydrocarbon-burning cells. It is reported that they develop almost twice the voltage and current density of the hydrogen-burning cells, so that fewer cells can do the same job. Also the sodium, which is in the form of an amalgam, is easier to store than is hydrogen.

The cells weigh 2-3 lbs./kwh of capacity, including fuel storage, which is said to be only 1/30 the weight of lead-acid storage batteries of equivalent power output (75kw).

## Black Polyethylene Resin Now Offered for Coatings

Black pigmented polyethylene resin for extrusion coating onto paper, paperboard or aluminum foil has just been introduced by U.S.I. This resin is expected to find application in products such as automobile door liners, agricultural mulch-coated paper and packages for photographic film or paper.

Coatings 0.75 mil (19 microns) or greater made from PETROTHENE® 201-220 polyethylene resin provide an effective light and moisture barrier. Good carbon black dispersion and the absence of non-homogeneous particles also contribute to the light-tight barrier properties of the resin. Adhesion onto paper or paperboard is excellent. For coating aluminum foil, a primer is necessary for good adhesion.

For literature on this resin, address Technical Literature Dept., U.S.I. Chemical News, 99 Park Ave., New York 16, New York.

CONTINUED

## *Titanium*

A prototype titanium coil has already lasted three years in service, and is still in excellent condition, according to the report. The material previously employed lasted only nine months before corrosion build-up made it unusuable.

### Titanium for Defense

Thanks to the above factors, plus a stepped-up national defense program, the market for titanium has been going up. Production and sales in 1960 are estimated at over 7 million pounds, according to Reactive Metals—the integrated titanium producer owned in part by U.S.I.'s parent company, National Distillers.

Titanium weighs only about 55% as much as steel; is impervious to corrosion from salt water or acids. Some titanium alloys retain their integrity at temperatures up to 2.000°F. for short periods. That's why large quantities of the metal are going into the B-70 bomber program; into the Army's "Davy Crockett" program for equipping foot soldiers with a lightweight automatic weapon; into space vehicles and missiles; and into jet engines.

CONTINUED

## *Vitamin E*

Prior to study, experimenters reasoned from two facts that dietary tocopherol needs might be proportional to fatty acid levels in the diet. The facts were: tocopherol acts as an antioxidant in normal tissues; unsaturated fatty acids, incorporated into depot fat as a result of high intake, increases the susceptibility of the fat to autooxidation.

Studies with both animals and humans have supported this reasoning, it is reported. In consequence, the researchers feel that those who advise supplementing the diet with vegetable oils should also provide for greater intake of tocopherol.

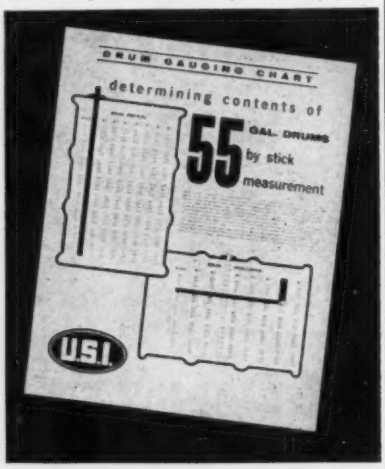
## Have You a New Product To Tell the World About?

Make it routine to send your publicity releases on new products and developments to the Editor of U.S.I. Chemical News, often called the "Front Page of the Chemical Process Industries."

## New Drum Gauging Chart Offered by U.S.I.

A new drum gauging chart, for determining how much liquid is left in an open drum, is now available from U.S.I. The new wall chart covers both 30- and 55-gallon drums. It converts wet inches of stick measurement to gallons of liquid—for drums gauged horizontally or vertically—at temperatures from 30°F. to 90°F. The chart is designed specifically for gauging ethyl alcohol, but can be used for any liquid with a similar coefficient of cubic expansion.

Copies may be obtained by addressing Technical Literature Dept., U.S.I. Chemical News, 99 Park Ave., N.Y. 16, N.Y.




## TECHNICAL DEVELOPMENTS

*Information about manufacturers of these items may be obtained by writing U.S.I.*

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**Butyl myristate, butyl palmitate, butyl stearate** now offered in 99.8+% purity. Because of high purity, these fatty acid derivatives are claimed useful as gas chromatography standards. Vapor phase chromatograms available for all 3. **No. 1692**

**New particle counter** is self-contained instrument said to be useful both for research work, and for monitoring particulate matter in atmospheres of such areas as clean rooms for precision manufacture and assembly. **No. 1693**

**Lithium aluminum tri-t-butoxy hydride,** new complex hydride that reduces acid chlorides to aldehydes, now available in lab quantities. Also useful for stereospecific reductions of steroid ketones to hydroxy derivatives. **No. 1694**

**Amino acid analyzer** described in new brochure. Gives features and use of instrument for automatic analysis of protein and peptide hydrolyzates, physiological fluids, tissue extracts, foods, culture media, pharmaceuticals. **No. 1695**

**New fatty hydroxamic acids,** now produced commercially as chemical intermediates, have reactive OH and NH group as well as long, straight chain fatty group. Can react with alkalis, metallic ions, acylating agents. **No. 1696**

**Mathematical puzzles and pastimes** are subject of book now being sold. Puzzles based on match-stick geometry, "once-over" curves, perpetual calendar, etc. Includes 100s of puzzles, answers, explanations, current applications. **No. 1697**

**New iodine titration indicator** is said to be stable, with good shelf life, and to be readily soluble in cold water, giving clear colorless solution. Reacts with iodine in presence of iodide, forming deep blue complex. **No. 1698**

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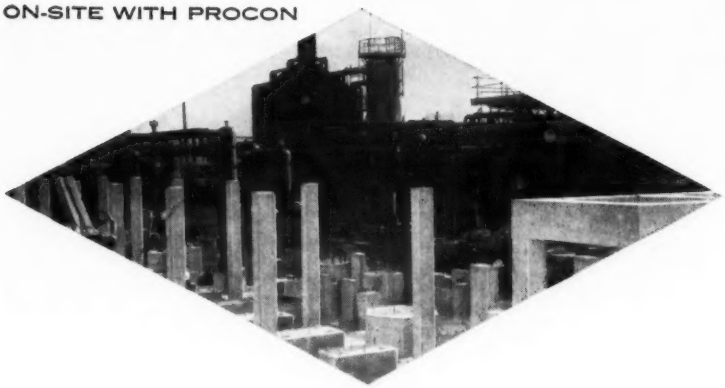

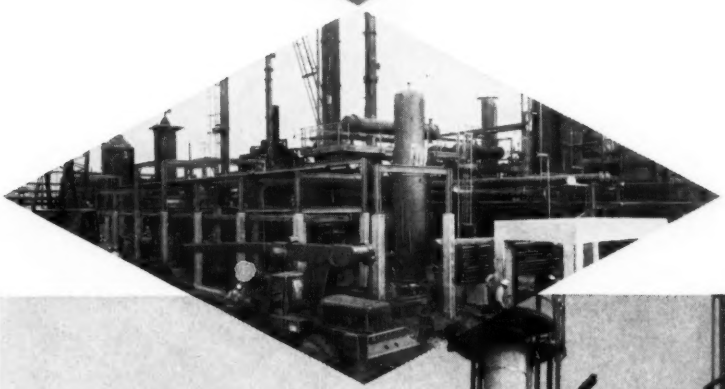

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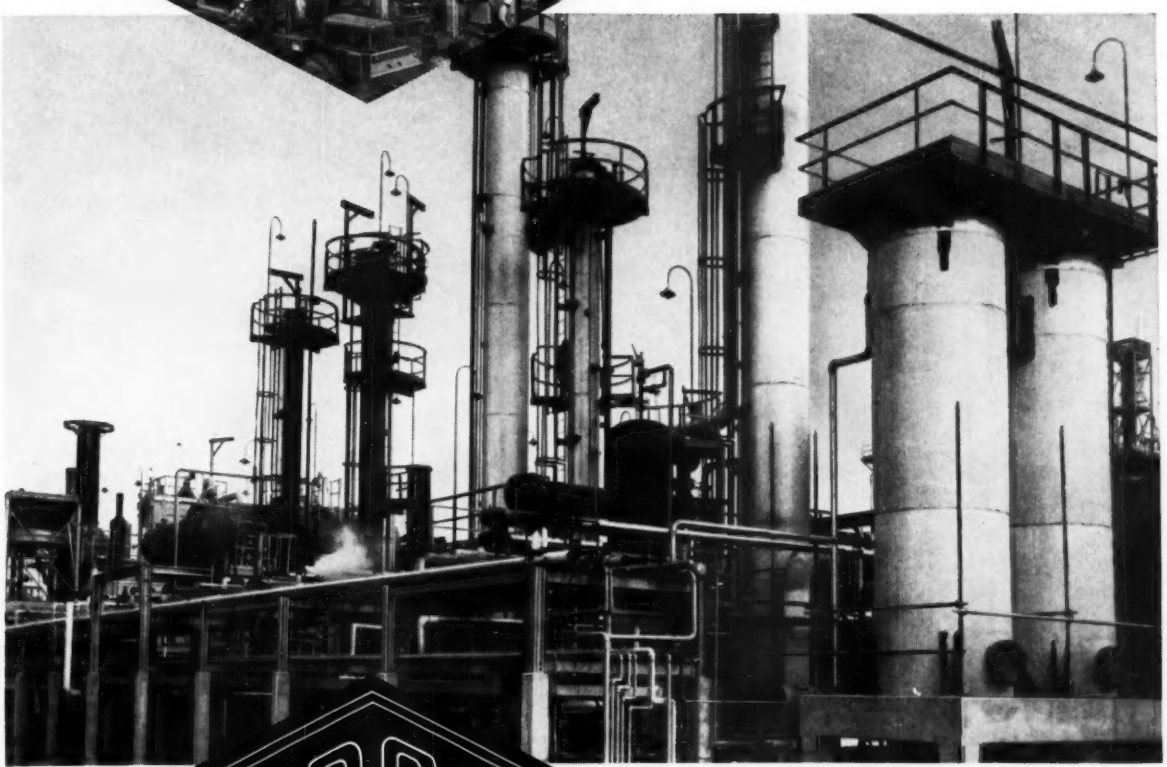

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**Wage Settlements Since the Presidential Election**

| Company | Location | Union | Wage Increase |
|---|---|---|---|
| Union Carbide Nuclear | Oak Ridge, Tenn. | OCAW | 9¢/hour |
| National Carbide | Louisville, Ky. | Firemen & Oilers | 7¢/hour |
| Allied Chemical | Philadelphia, Pa. | OCAW | 4% |
| American Cyanamid | Fortier, La. | OCAW | 4% |
| Morton Chemical | Manistee, Mich. | OCAW | 7¢/hour |
| Allied Chemical | Hopewell, Va. | UMW | 3% |
| Norwich Pharmacal | Norwich, N.Y. | ICWU | 5% |
| Hewitt-Robins | Buffalo, N.Y. | United Rubber Workers (AFL-CIO) | 18¢/hour |
| Firestone Synthetic Fiber | Hopewell, Va. | UMW | 24¢/hour |
| Olin Mathieson Chemical | Pasadena, Tex. | OCAW | 14¢/hour |

Abbreviations: UMW — District 50, United Mine Workers. ICWU — International Chemical Workers Union. OCAW — Oil, Chemical & Atomic Workers Union.

# Prelude to Labor's Big Push in '62

***Job security, not wages, will be labor's prime bargaining goal in '61. But look for stiffer demands in '62. Also in the cards: stepped up organization drives.***

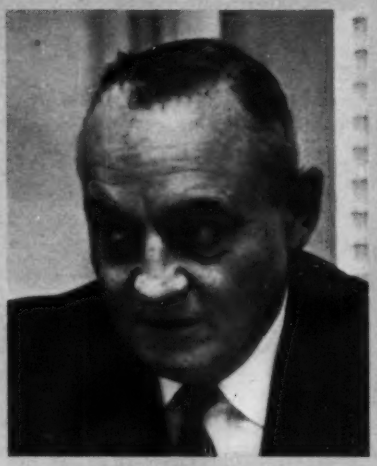
**Negotiators don't look for easy,** quick settlements of major chemical process industries' labor contracts that are up for renewal this year (e.g., American Cyanamid at Bound Brook, N.J.; Spencer Chemical at North Pittsburg, Kan.). Neither companies nor unions expect to make big concessions. Management's tougher bargaining stand is dictated by dwindling profits; labor's demands are influenced by the kindred threats of unemployment and automation. The inevitable result: a tough year of labor negotiations—with an even tougher fight looming for '62.

While the '61 contracts are still in the wait-and-see stage, chances are that settlements won't be markedly different than last year's. Union leaders expect that wage agreements will follow the pattern of recent months (*see table, above*), averaging out at 6-10¢/hour increases. Fringe benefits will get more attention, with the big bargaining thrust being made at lowering the eligibility age for pensions. Company spokesmen believe labor's "money" gains will be slightly less this year than last. They're less sanguine about '62.

But '61's demands cannot be lightly dismissed by management. Last year's wage increases, according to a new estimate by the U.S. Dept. of Labor's Bureau of Labor Statistics, covered some 7 million workers (85% of those employed under major collective bargaining contracts); most boosts were agreed to or put into effect in '60. Of those workers receiving increases, about 4.3 million were employed under contracts that were renewed during '60. Most of the rest received deferred increases (frequently including cost-of-living raises) under contracts negotiated in previous years. About 1.4 million (20%) of the total received 10-11¢/-

## Key labor leaders chemical management will face in upcoming talks on

CLYDE S. SHAMBLEN is District 7 director of the Oil, Chemical and Atomic Workers. District 7 is the second-largest in OCAW, encompasses Illinois, Indiana, western Kentucky and western Michigan. Membership is about 40% oil industry workers, 60% chemical industry employees. Fifty-three years old, Shamblen is 6 ft., 4 in. tall, weighs 240 lbs. Active in unions since '23, he helped organize the Pure Oil Co. (Toledo, O.) refinery, also served on the Toledo Labor-Management Citizens Committee. Appointed international representative for OCAW in '51, he became director in '57.



J. ELRO BROWN heads OCAW's District 4, which boasts 32,000 members in Louisiana and along the Gulf Coast of Texas. He attended Louisiana State University, worked for Texaco from '33 to '44, served as president in '42 and as secretary in '43 of the Port Arthur, Tex., Local Union No. 23 (Oil Workers International Union). From '46 to '49 he served on Gov. Earl Warren's advisory committee to the California State Employment Service. As international representative of OWIU in Chicago ('49-'51) he served on Gov. Adlai Stevenson's Advisory Committee on Industrial Safety.

O. A. "JACK" KNIGHT, vice-president of AFL-CIO, is president and key man of OCAW. Born in New Hampton, Iowa, in 1902, he graduated from high school there and went into highway construction work. In '26 he went to work for Shell Oil in East Chicago, Ind., helped organize the plant in '33. In '54 and '55 he brought about the merger of the Oil Workers International Union with CIO's Gas, Coke and Chemical Workers. This culminated with the establishment of OCAW in '55, when Knight was elected president of the merged union. He has been re-elected annually.

hour more, the most common increase.

**Signs of the Times:** One significant note is that the recession pressures on company management aren't going unnoticed by union heads. Thomas McCormick, secretary-treasurer of the Oil, Chemical & Atomic Workers Union, recently called on workers throughout the country to "quit asking for overtime," try instead to halt spreading unemployment. He also urged union members to give up second jobs, noting that more than 3 million people, "half the number unemployed," hold more than one job. McCormick said that both steps will require a great deal of education among workers. He feels that a shorter work week would help cut unemployment, but until it becomes general, "the best way to provide work is to make employers hire those out of work to do extra jobs." Consolidation and retrenching, mainly due to automation, has cost OCAW 15% of its membership in the last four years.

An unusual labor - management agreement on production standards between Goodyear Tire & Rubber Co. (Akron, O.) and Local 2 of the United Rubber Workers recently paved the way for an $8-10-million modernization program. Goodyear, faced with a higher-than-competitive production cost per tire, asked for assurance by the union that higher production rates with new equipment would be met by employees. Goodyear went ahead with plant improvements after an agreement following four weeks of negotiations. Clarence Adkins, Local 2 president, said the agreement "signifies a great step forward in keeping production and jobs in Akron."

**Union Demands:** Despite unions' general awareness of the complexity of CPI economic problems, they are not agreeing to company plans without argument. Two hundred unionists recently rejected a pay cut proposed by Norton Laboratories Inc. (Lockport, N.Y.) to help the company maintain "a sound competitive position." The pay cut was outlined by General Manager K. O. William Sandberg at a special meeting of Norton Unit No. 3, Local No. 686, United Auto Workers (AFL-CIO). Sandberg presented economic trends in the plastics industry, claimed a wide differential in wages and fringe benefits paid by Norton, compared with its competition, and asked for an adjustment in wages.

Nevertheless, according to a broad section of union workers polled by Opinion Research Corp. (Princeton,

**wage rates and fringe benefits.**

ALMA DENNIE LEWIS was re-elected president of District 50 of the United Mine Workers at a special constitutional convention of the union last month. District 50, with 200,000 members, is now larger than its parent union. Lewis, commenting on District 50's good organizing record, said it could have 1 million members in four years, when the next convention will take place. Veteran labor leader Lewis was born in Colfax, Iowa, in 1889, worked in coal mines in his youth, became District 50 president in '54. He is a long-time director of the National Bank of Washington, D.C.

EINER O. MOHN is president of the 400,000-member Western Conference of Teamsters (since '58) and vice-president of the general executive board of the International Brotherhood of Teamsters. He included chemistry and bacteriology among his courses at the University of Washington; says he put this knowledge to use in his first job in the milk industry. Mohn organized Western dairy plants in the '30s. At the showdown between IBT and AFL-CIO in Atlantic City in '57, Mohn was chosen to present the Teamster's case. He was administrative assistant to Dave Beck in '53.

WALTER L. MITCHELL, a soft-spoken Alabaman, began his career as a union organizer at the Tennessee Valley Authority chemical plant where he was employed as a laboratory analyst. After combat duty in the infantry during World War II, he returned to union work. In '46 he became vice-president of the newly formed International Chemical Workers Union. He studied law at night, was admitted to practice before the U.S. Supreme Court in '53. Elected ICWU president in '56, he uprooted factionalism, was re-elected in '58 and '60. ICWU has built up a substantial strike fund.

N.J.), most union people don't relish work stoppages. Of members polled, 84% support the 80-day "cooling-off period," which can be ordered by the courts (on request of the President) under the provisions of the Taft-Hartley law.

**Tests:** And it seems clear that labor's professed hope to avoid stoppages will have an important test in this troubled year. For example, chemical processors in Texas, which have had little difficulty during recent slow months, now find their position less favorable than usual. A report by the Texas Chemical Council (Austin) last week shows that the state's rate of expansion in chemicals slowed during '60 to its lowest level in 10 years. Texas got about 33% of the total U.S. chemical construction in '59, slipped to 14% in '60. (Plastics, synthetic rubber, sulfuric acid, chlorine, caustic soda, ammonia, fertilizers and aluminum are among the state's chief products.)

While expressing hope that the downtrend is temporary, the council's president, Glenn Purcell, attributed the '60 slackening to factors that apply in most areas of CPI concentration:

- Lower net profits for most chemical operations, despite record total sales for the chemical industry. Higher labor and raw-material costs combined with lower product prices in some areas create this situation.
- Foreign expansion by chemical companies seeking to firm up their profit margins. It has been estimated that more than 15% of the expansion by U.S. chemical firms is now being made in other countries.
- Uncertainties in Texas politics.

**Demands:** Strikes now under way mirror the trend in union demands. OCAW members striking at Phillips Chemical plants at Pasadena, Borger and Dumas, Tex., are in for a "hard, tough fight," according to OCAW District Director Dial Murphy. The major issue, according to the union, is the right to bargain over various benefit plans which OCAW calls "unilaterally determined by Phillips management, although workers pay nearly two-thirds of the cost of these plans."

Operating conditions and wages are key issues at Crown Zellerbach's polyethylene film processing plant near Orange, Tex. Organized by OCAW in '60, it was struck by OCAW Local 4-23 last week after negotiations on new contracts broke down.

Bargaining "of the hardest sort"

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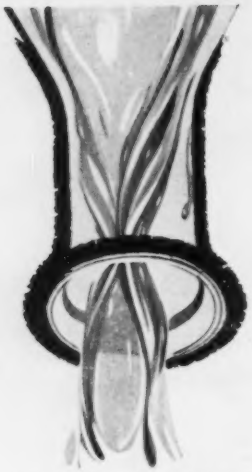
Lab analysis is done right in the control room of this Carbide processing unit. Necessary process adjustments can be made on Foxboro controllers the minute technician detects the need.



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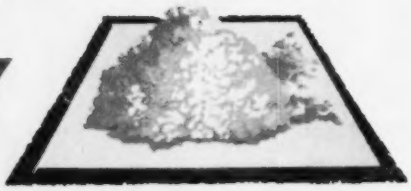

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for wages, hours and working conditions is forecast by the International Assn. of Machinists Local 1955 at the United States Gypsum Co. plant in Plaster City, Calif. A final National Labor Relations Board decision last month put IAM in as bargaining agent for plant employees. U.S. Gypsum had unsuccessfully appealed results of an NLRB election to the regional board in Los Angeles and to NLRB headquarters in Washington, D.C.

**Advisory Committee Blues:** Both management and labor have some reservations about the long-term value of President Kennedy's new advisory committee* on labor-management policy. But labor leaders believe the hope it offers for solving job problems caused by automation through retraining programs, shifting workers to new industries and other devices may offset the possible restrictions the committee may impose on the size of wage settlements. The committee claims it will not get into disputes or suggest settlement terms; AFL-CIO officials expect that broad pronouncements of caution by the committee will have the effect of inhibiting the size of settlements.

Still somewhat cool to the committee plan, some industrial relations directors feel that labor relations problems are best solved by collective bargaining, but not by a few individuals who might commit an entire industry to an agreement without having full knowledge of all of the facts.

**Slacker Reins:** That point, in fact, reflects a basic worry of management: that its grip on the right to discipline employees is being weakened. Most union contracts provide for an out-

* Names and titles of the new committee. For the public: Labor Secretary Goldberg and Commerce Secretary Hodges (alternating chairmen); Ralph McGill, editor and publisher of the *Atlanta Constitution;* George W. Taylor, professor of labor relations, Wharton School of Business, University of Pennsylvania; Clark Kerr, chancellor of the University of California; Arthur F. Burns, chairman of the National Bureau of Economic Research; and David Cole, arbitrator.

For management: Thomas Watson, Jr., president of International Business Machines Co.; Joseph Block, president of Inland Steel Corp.; Henry Ford 2nd, chairman of the board of Ford Motor Co.; J. Spencer Love, chairman of the board of Burlington Mills; John Franklin, president of United States Lines; Richard S. Reynolds, president of Reynolds Aluminum Co.; and Elliot Bell, editor and publisher of *Business Week.*

For Labor: George Meany, president of AFL-CIO; Walter P. Reuther, president of United Auto Workers; David Dubinsky, president of International Ladies Garment Workers; George Harrison, president of the Brotherhood of Railway Clerks; Thomas Kennedy, president of the United Mine Workers; David J. McDonald, president of the United Steel Workers; and Joseph D. Kennan, secretary-treasurer of the International Brotherhood of Electrical Workers.

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side arbitrator to settle disputes, many of which concern discipline. Frequently, management's decision to discipline an employee is reversed by an arbitrator. And even in nonunion companies, discipline right is sometimes slipping away. Such companies often relinquish this right, in effect, through fear of union organizing threats.

There's no evidence, either, that union strength will diminish. This month, a voluntary strike-financing plan conceived by OCAW President O. A. Knight swings into operation. It's raising $50,000/month to start, is expected to form a pool of $2 million or more, eventually provide OCAW strikers with as much as $25/week.

**Look Ahead:** For the time being, talk of mergers among unions bargaining in chemicals has about died out. There is no solidly established single union in chemicals comparable, say, with those in the steel or auto industry —or the Teamsters. Since chemical plants in some areas fall under the influence of oil refineries and related installations, OCAW's 5% or 14¢/-hour settlement pattern for '61 in the oil industry may affect the CPI.

But the outlook could be a lot different in '62. Although it won't affect '61 negotiations, the AFL-CIO has a new organizing thrust in the offing for chemical companies. Federation leaders have eliminated a serious organizing problem. Until now, the AFL-CIO's organizers have been restrained from helping chemical unions organize because of a rivalry between the International Chemical Workers Union and OCAW. Whenever either union would stake out an organizing claim, the rival union would immediately file a counterclaim, at which point the AFL-CIO was barred from helping.

Now AFL-CIO leaders have decided that "paper claims will not be recognized" and that unless the second union shows it is seriously determined to organize with manpower and funds, it can't hold up its rival. AFL-CIO President George Meany now has the authority to decide whether a territorial claim is legitimate. While this plan won't immediately start a mass organizing drive, it is expected to push the rival chemical unions into agreements that will divide up the nonunion territory in the industry.

It means '62 may be a more crucial year than '61 for management in its labor negotiations.

## KEY CHANGES

**Bernard R. Krashin** to vice-president, marketing; **Gordon E. Cole** to general sales manager, Air Reduction Chemical and Carbide Co., newly formed division of Air Reduction Co., Inc. (New York).

**William A. Kerr** to vice-president, Bausch & Lomb Inc. (Rochester, N.Y.).

**Frederick L. Schuster** to the board of directors, Foster Wheeler Corp. (New York).

**J. William Hinkley** to the board of directors, Wallace & Tiernan Inc.

**Lewis A. Rupp** to executive vice-president, Ionics, Inc. (Cambridge, Mass.).

**Leonard C. Barr** to president, Eutectic Welding Alloys Corp. (New York).

**Fred J. Kirchmeyer, Arthur W. Weston** and **George R. Hazel** to vice-presidents, Abbott Laboratories (North Chicago, Ill.).

**Robert B. Newman** to vice-president, Vulcan Containers Pacific Inc. (San Leandro, Calif.).

**Francis H. Ludington** to board chairman and chief executive officer, Chase Bag Co. (New York).

**Charles W. Coker** to president, Sonoco Products Co. (Hartsville, S.C.).

**Roy J. Diwoky** to chief executive officer, Crown Central Petroleum Corp. (Baltimore, Md.).

**Robert V. Gunther** to executive vice-president and general manager, Southwestern Engineering Co.

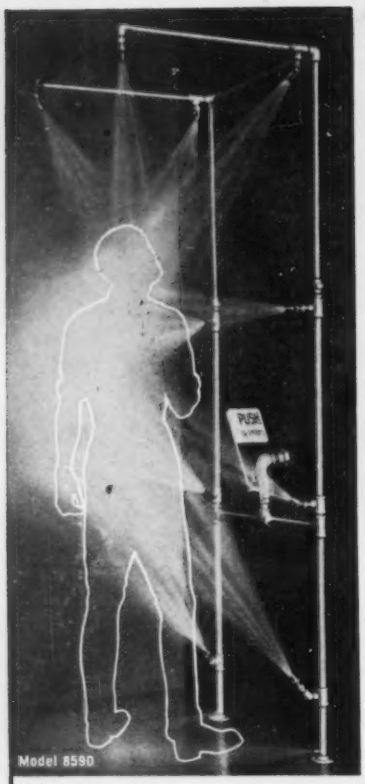
**John N. Gammon** to vice-president in charge of Industrial Division sales, Nopco Chemical Co. (Newark, N.J.).

**Donald C. Bailey** to vice-president and general manager, St. Clair Chemical Ltd. (Sarnia, Ont.).

**William J. Meinel, John Mulford** and **Gerry Swinehart** to the board of directors, Selas Corp. of America (Dresher, Pa.).

**DeWitt Peterkin, Jr.,** to the board of directors, Stauffer Chemical Co. (New York).

**Edwin W. Pauley, Jr.,** to the board of directors, Dyna-Therm Chemical Corp. (Culver City, Calif.).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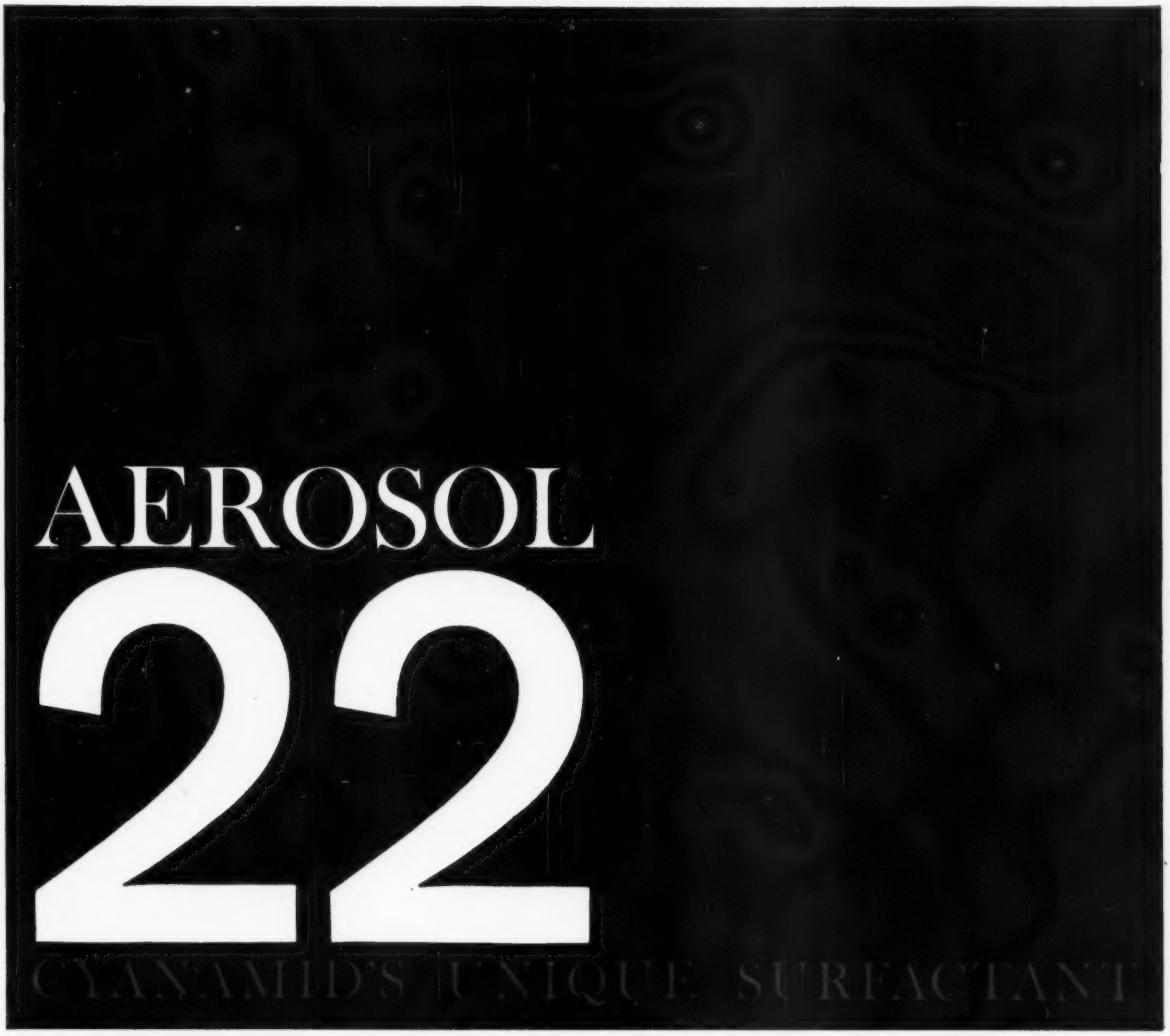


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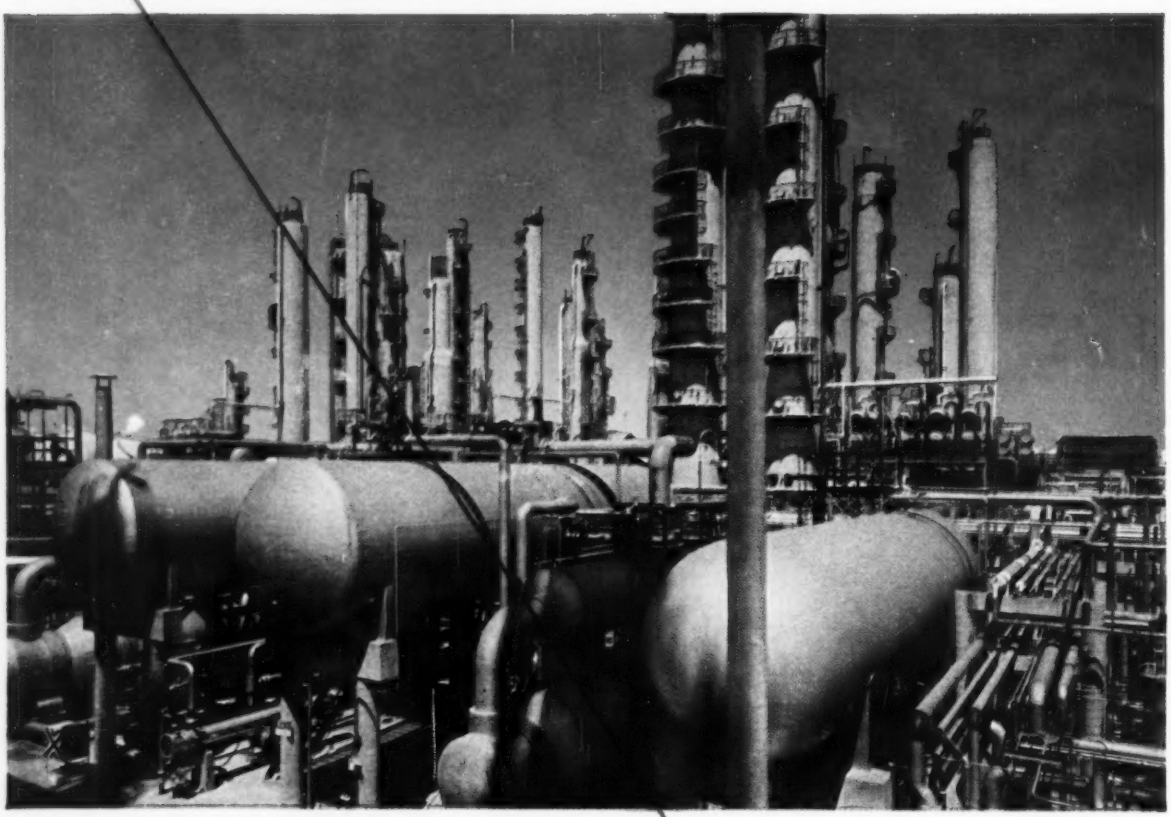

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# Technology
## Newsletter

CHEMICAL WEEK
March 18, 1961

**A nonresinous "reactive" finish for wash-and-wear cottons** has been developed by General Aniline & Film. Instead of polymerizing, the new finish reacts only with the fiber. This gives it, according to GAF, a soft hand and permanency—two of the big problems with conventional resin finishes. In addition, the firm says the new finish, called Ganalok, does not discolor or form odors, withstands any kind of bleach and has high wet and dry crease recovery. Main drawback is cost—for both the chemical and the processing. However, Van Heusen is introducing a shirt (price $5) using the new agent. GAF has a patent application on the chemical, won't say what it is, other than a difunctional, water-soluble cross-linking agent.

•

**Various catalysts and stabilizers for trioxane polymers** described in Celanese patents of the past year may give some clues on the company's new Celcon acetal resin. U.S. 2,936,298 describes the use of N,N,N,′,N′-tetra (monohydroxyalkyl)alkylenediamine as a thermal stabilizer for polyoxymethylene resins. Ethanesulfonic acid can be used as a catalyst to polymerize trioxane to a tough, high-molecular-weight polymer in less than 24 hours, according to Patent No. 2,947,727. And No. 2,947,728 indicates that the time can be reduced to as little as 30 seconds by use of stannic chloride, titanium or zirconium tetrachlorides. The most recent patent, No. 2,951,059, covers the use of vapor catalysts such as boron trifluoride to make the process continuous (*CW, Feb. 18,p. 139*).

•

**Installation of the world's largest electron-beam furnace** is claimed by Stauffer Chemical Co. (Richmond, Calif.). Rated at 300 kw., the furnace is designed to produce 30,000 lbs./month of refined refractory metals (*CW, March 7, '59, p. 39*). It can cast ingots up to 8 in. in diameter and 42 in. long, whereas the previous diameter attainable was 6 in. Metals to be cast include columbium, tantalum, tungsten, beryllium, molybdenum and stainless steels.

•

**A new nylon process is readying for production.** Toyo Rayon (Nagoya, Japan) will soon start producing 5 tons/day of nylon, using the nitrosyl chloride process. The patented process starts with cyclohexane, uses photoelectric energy to obtain nitrocyclohexane, converts this into cyclohexanone oxime, rearranges the oxime into caprolactam. Toyo says that production costs will be less than those of the process developed by Snia Viscosa S.p.A. (Mailand, Italy).

Still in the pilot stage, the Snia process has been licensed by Allied Chemical (which once researched a nitrosyl-light energy process but abandoned it). The Italian process starts with toluene instead of conventionally used phenol. Allied says that its plans for commercializing the Snia process depend on the now-closing price gap between toluene and benzene

(the latter is raw material for phenol). Benzene is now priced at 9¢/gal. more than toluene, 34¢/gal. vs. 25¢/gal. (*see story, p. 32*). But if the gap closes, Allied feels it wouldn't pay to switch to a toluene-based process.

•

**A new multipurpose industrial control computer** that helps build mathematical models and performs process and quality control has been made by IBM. Called the 1710, it is made by combining the solid-state 1620, a one-year-old small-size digital computer used for engineering calculations, and the 1711, a new data converter that translates instrument readings into computer language. This development follows IBM's process control experience at Standard Oil (Indiana) and Standard Oil Co. of California (*CW, Oct. 22, '60, p. 31*).

The 1710 can handle 300 analog signals at the rate of five per second; it has 20,000 positions of magnetic core storage, expandable to 60,000. Price of the 1710 ranges from $111,000-$135,000 and the monthly rental is $2,600-$3,300, depending on the optional equipment. First deliveries will be in fourth-quarter '61.

•

**Lightweight glass-fiber rocket motor chambers,** reinforced with nonwoven glass fibers, are destined to become standard equipment soon for space vehicles, says the Navy. Chambers of this type will cost about one-fourth as much as currently used metal chambers and will be up to three times as strong on a weight basis. The prediction comes from chemists at the Naval Ordnance Laboratory in Silver Spring, Md., near Washington. They have developed a test device for studying glass fiber that will hasten use of the new chambers.

Tests conducted so far indicate that the application of a chemical finish to glass fibers is an important factor in improving the tensile strength of a glass fiber-reinforced plastic. The Navy is already using filament-wound glass-fiber construction for the upper (second) stage of the Polaris missile; and the Air Force will use such construction in the upper (third) stage of the Minuteman (*CW Technology Newsletter, March 11*).

•

**Percentage of sales spent on research by foreign firms** trails U.S. levels, according to Knapsack-Griesheim, a subsidiary of Farbwerke Hoechst. Figures for '59: U.S., 2.8%; Germany, 2.5%; Great Britain, 1.8%; Canada, 1.1%; France and Italy, each 1%. Among individual German companies, Chemische Werke Huels is pegged at 5%, Farbenfabriken Bayer and Hoechst each at 4.5% and Badische Anilin- & Soda-Fabrik at 4.4%. Britain's Imperial Chemical Industries is listed at 1.8%. These figures compare with '60 figures of 5.5% for Union Carbide, 4.5% for Du Pont, 2.8% for Allied Chemical (*CW, Feb. 4, p. 57*).

Total U.S. chemical research expenditures in '60, newly estimated by the Commerce Dept.'s Business and Defense Services Administration, were approximately $1 billion, compared with $784 million in '58.

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**Kellogg's Farstad, manager of technical service, and researcher beam over new linseed vehicle's gloss.**

# Pointing the Way to Better Oil-Based Paints

**Makers of synthetic latex emulsion paints, having grabbed off a large chunk of the interior finish business, are now in hot pursuit of the exterior housepaint market. But makers of conventional oil-based exterior paints, and suppliers of the drying oils used in these paints, have in the last few weeks put on a new product push intended to avoid a market loss. Their tactic: fight water with water by developing water-thinnable oil paints.**

At stake is the biggest single market for drying oils (linseed, soybean, tung, castor oil, which dry to form the paint film)—the U.S.'s 668.7-million-gal./year paint, varnish and lacquer industry. These drying-oil vehicles, once used (1940) at the rate of 2 lbs./gal. in the paints and varnishes produced in the U.S., are now used in only a 1-lb./gal. ratio. In the past 20 years use of synthetic resin vehicles has increased from 0.3 lbs. to more than 1.3 lb./gal. And since paints and varnishes account for about 80% of the total drying-oil usage in the U.S. (floor coverings, oil cloth, inks and core oils account for the rest) it's virtually a necessity that drying-oil producers hang on to the exterior paint market to survive.

Alkyd resins paints that are formulated with oils (mostly soybean and castor oils) provide an outlet for some (160 million lbs./year) drying oils, but the big market is the 100-million-gal./year exterior paint field.

Because it's had the lion's share of the exterior paint vehicle market and because most (78%) of its use is in paint and varnishes, the major drying oil getting attention these days is linseed oil. Spencer Kellogg, Cargill Corp. and the U.S. Dept. of Agriculture all are working on new products to reduce the market loss to the synthetic latex emulsions (especially acrylics).

In addition to warding off competition from synthetics, linseed oil suppliers must also protect their markets from other fats and oils in the U.S.'s 900-million-lbs./year drying-oil market. In '40 linseed oil had about 72% of the market (at that time, 807 million lbs./year); tung oil had 8.3%; fish oil, 5.8%; soybean oil, 5.7%; castor oil, 3.1%; perilla oil, 2.4%; oiticica oil, 1.8%; others, 0.5%.

But in '59 linseed oil's share of the market (900 million lbs.) was around 49%, with soybean oil up around 18% and castor oil up to 9.5%. Tung oil use went down to 5%. Low-priced tall oil, used in second-grade paints, has also cut into linseed oil sales. Most of the gains for linseed's competitors, however, have been in non-paint applications of drying oils, such as core oils, floor coverings and inks. Exterior finishes, to which linseed oil looks for about three-fourths of its markets, have been relatively safe from natural-product competition. It's the latter market that linseed oil makers want to preserve from incursion by the synthetic latex materials.

**Kellogg's Cure:** Spencer Kellogg's (Buffalo, N.Y.) answer to this competition is a new water-soluble linseed oil paint vehicle that it calls Linaqua (development name XP-1282). According to Robert Terrill, vice-president, Linaqua is designed to provide paints that allow water thinning and easy cleanup (as do synthetic polymer

emulsion paints) and provide good one-coat hiding, high gloss and simplicity of formulation (which the synthetics do not) at a lower manufactured price ($2/gal. vs. $2.24/gal. for an acrylic latex paint).

SP's technical service manager, Dan Farstad, says that while Linaqua vehicle penetrates and adheres to old, chalky paint surfaces, use of a synthetic latex coating nearly always calls for an oil-based primer on such a surface. Some synthetic latex paints require the addition of drying oils for added adhesion, and this, Kellogg feels, underscores the essential advantage of linseed oil paints.

Another quality of the water-soluble vehicle that Kellogg is banking on: it lends itself to formulation by techniques similar to those used in making conventional linseed oil housepaints.

**Not Perfect:** Some of the drawbacks of paints made with Linaqua, compared with those of synthetic latex paints, appear to be a longer drying time (overnight vs. a few hours), less coverage per gallon of paint (fewer coats are necessary, however) and lack of easy brushability (although it's more easily applied than conventional linseed oil paints). Yellowing may also be a bigger problem with linseed vehicles than with the acrylic latex type.

Kellogg isn't describing its new vehicle in detail except to say that it's an 85%-solids material with a volatile coupling agent (*CW*'s guess: Carbitol) added to give it water solubility. After the paint is applied, this coupling agent evaporates, leaving a continuous, water-insoluble and water-resistant film. The vehicle is now being made at Kellogg's Chicago plant (price: 32¢/lb.) and can be made commercially at the company's other plants at Bellevue, O.; Minneapolis, and Edgewater, N.J.

**Heat Cured:** Cargill Corp. (Minneapolis) is now offering in limited commercial quantities a linseed oil emulsion vehicle, XE 1308, which is 100% heat polymerized. This emulsion is said to be very stable and to have good zinc oxide stability. Like the Kellogg vehicle, it can cover almost all substrates (except cedar and redwood) without a primer. It provides a water-resistant film within 30-45 minutes, although it has a tacky surface for a number of hours.

The company projects a 17.5¢/lb. selling price for a 60%-solids vehicle and pegs paint cost at 30-50¢/gal. less than that of an acrylic emulsion paint—also somewhat cheaper than paints obtained with the Kellogg vehicle.

One major Eastern retailer is offering a linseed emulsion primer now based on this product, and a couple of small paintmakers are expected to have available soon a linseed emulsion exterior housepaint manufactured with it.

The U.S. Dept. of Agriculture is developing a linseed emulsion vehicle at the Northern Utilization Labs in Peoria, Ill. (*CW, Oct. 29, '60, p. 34*). Although the materials developed there so far have lacked prolonged ability to keep zinc oxide in stable emulsion, this problem may be licked soon. If USDA does develop stable materials (it has one-year stability, wants four-year), it could enable paintmakers to make their own vehicles (as most prefer to) from special oils supplied by linseed oil producers.

Work on linseed oil paints is also going on at North Dakota State University (Fargo, N.D.). A group there, under the direction of A. E. Rheineck, hope to eliminate the yellowing associated with linseed oil-based paints. This yellowing is due to oxidation of linolenic acid content (40-45%) of linseed oil and the North Dakota group has chemically modified the linseed oil to overcome this. If the yellowing can be overcome, linseed may gain back some of the markets it lost to safflower and soybean oils in alkyd resin formulations; nonyellowing linseed will also likely be attractive to makers of exterior paints.

**Stay Indoors?** Latex paint producers now have 10-20% of the exterior wood paint market. They'll probably get more, too, according to most trade observers. But it won't be a repeat of their performance in the interior paint field, where they started from scratch in '48 (with styrene-butadiene materials) and boosted sales to better than 75 million gal./year —most of it for indoor use.

Makers of latex paints and flat alkyds have pushed the linseed oil paints outdoors, now would like to chase them around the house and out of the yard. They'll probably find, however, that linseed oil people are now going to fight back.

## West German Aerosols

**Aerosol products** are catching on in West Germany. In '60, production rose to about 40 million units (0.8 cans/person), compared with 27 million in '59 and 18 million in '58.

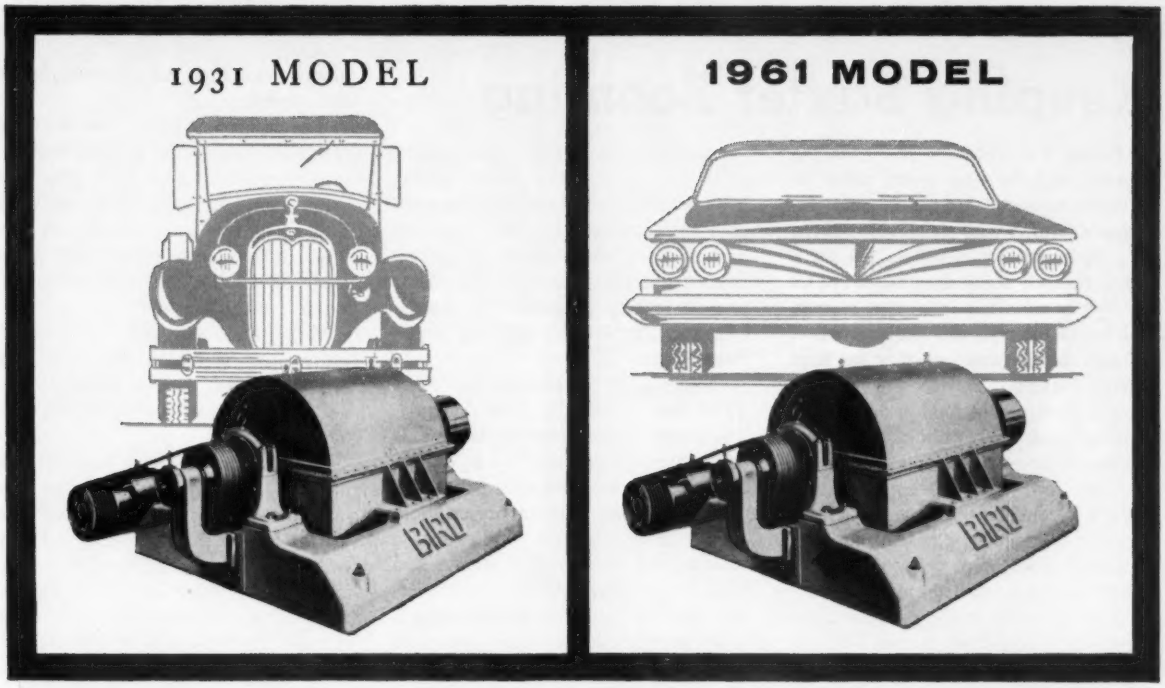
The German aerosol industry expects fast-growing popularity of the sprays to hike production to 100 million units by '62 or '63. This goal represents a per-capita consumption of 2 cans/year, but is still well below current U.S. per-capita consumption of 3.6 cans.

The lion's share—43%—of German aerosol containers made in '60 were used for hair sprays. About 23% were for insecticides, 12% for cosmetics, including perfume, shaving cream and sun tan lotion, and about 10% for room deodorants. The market for aerosol packaging of varnish, paint and polishes is also steadily expanding.

UPI

## No Beauty Gap

**The first "modern"** beauty salon behind the Iron Curtain recently opened in Moscow and though the new shop prides itself on giving the first chemical permanent wave in the U.S.S.R., most of its methods and equipment are about two decades behind Western counterparts. The chemical waves are still considered too advanced by some of the Russian women customers, who insist on using heavy curling irons and electric cords (*above*).

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# Keeping Baxter Booming

**Baxter Laboratories, Inc. (Morton Grove, Ill.), is now going after its seventh consecutive year of sales increases, armed with six new products. It's an impressive new-item list for a comparatively small drug house ($33.8 million in sales last year) that mirrors the broad interests and the aggressive, though limited, research that has kept Baxter moving.**

The growth contribution of the new offerings will likely be matched by increases from new acquisitions. During the last few years the company has shown a consistent pattern of acquiring new companies, plans to purchase a foreign drug company in '61 (no specific choice has yet been made).

And at home, while no new companies will be added, Baxter will put onstream this spring a new plant in Kingstree, N.C., to manufacture intravenous solutions.

**Step-up in '60:** Baxter's total net sales of $33.8 million last year was a 16% jump over '59's $29.2 million, the previous high. A slow fourth quarter, due to increased marketing expenses and a delay in some of the new products being introduced now, kept sales below the final period of '59. And it seems likely that first-half '61 sales will be somewhat below last year's. President William Graham told *CW*, however, that he expects that the new products coming out will hoist full-year '61 sales higher than those in '60.

Capital expenditures of the firm in '61 will climb to $2.6 million, compared with $2 million a year ago.

**New-Product Agenda:** Baxter has already launched some of its new products. In Canada last month Baxter brought to market a new anticholesterol ethical drug called Choloxin (chemically, sodium-dextro-thyroxine). It's said to work through normal body processes, reduce blood cholesterol levels without abnormally affecting metabolism.

Choloxin has been cleared for use by Canadian food and drug authorities, and will be sold for the first time this month in England and South Africa. The drug is awaiting use approval by the U.S. Food & Drug Administration.

A second new product, a salt-free, low-calorie wafer for pregnant women, called Orderv, has been in test markets about two weeks. The wafers (which taste something like cocktail crackers) contain a complete supply of vitamins and minerals, are intended as a substitute for prenatal vitamin pills. They also act to keep weight down—the 13-calorie wafer satisfies nibbling urges, Baxter says.

Dosage is three crackers/day. Each $2.49 box contains a 15-day supply. The product, like many of Baxter's, is an "ethical proprietary"—i.e., advertised exclusively to physicians but sold over-the-counter without prescription.

Also new this year is Urevert, a modification of a product Baxter had been selling previously as a brain decompressant. Now reformulated into a solution of lyophilized urea and invert sugar, Urevert is used to lower pressure on the brain resulting from tumor or concussion. It permits surgery in many cases where it formerly was not possible.

Still another newcomer, Latex-Trichina Reagent, is a rapid, slide-test antigen for aiding diagnosis of trichinosis. The reagent is prepared from polystyrene latex and an extract of *Trichinella spiralis*.

Other products to come from Baxter this year will have their roots in the company's Wallerstein Division (Staten Island, N.Y.), producer of industrial and pharmaceutical enzymes.

In the brewing field, Wallerstein has just begun to test market a still-unnamed modified carboxymethylcellulose product.

Baxter's William Graham counts on new products for continued growth.

Two pharmaceutical enzymes will reach the market in '61, the first results of combined research efforts of Wallerstein and its parent Baxter since Wallerstein was bought four years ago. They include an enzyme for debridement of wounds and a digestive enzyme.

Wallerstein was first to commercially produce dihydroxyacetone, the browning agent used in synthetic tanners such as Man-Tan (*CW, May 21, '60, p. 32*).

Sales of the tanners were big in the U.S. last year, but the market is now thought to be running out. In '61 the biggest sales potential probably will be overseas. The chemical is used in small quantities in tanning lotions, and actually accounts for only a small share of business. Other applications, however, currently are under investigation.

**Sticking to Specialties:** Baxter's research policy is concentration on specialty drugs. The company steers clear of production of steroids, vaccines, antibiotics, tranquilizers and vitamins.

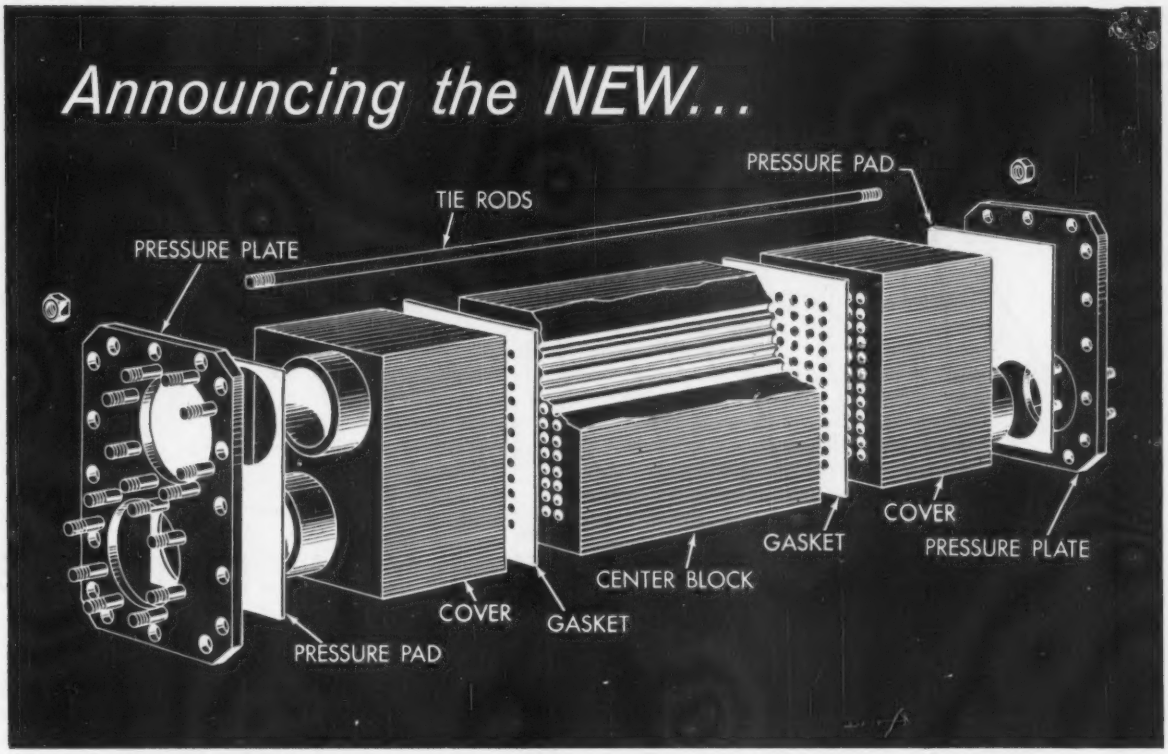
The reason, says Graham: "We feel that a medium-size company cannot afford to compete directly in all research areas with the big companies in our field."

Areas of prime interest to the company in terms of research include cardiovascular products, anticonvulsants, nutrition and metabolism drugs, artificial organs, diagnostic reagents and pharmaceutical enzymes.

Baxter's main R&D activity ranges from long-term projects—such as new synthetic chemicals like Choloxin — to short-term development of formulation-type products like Orderv. The majority of its projects tend to be short term (two to three years), but Graham points out that often the short term turns into the long. He cites two products that have been in development stage for years and are still not ready for market: a drug for use during open heart surgery, in the works six years, and a fat emulsion that Baxter has been researching for nine years.

Whenever these products emerge from the laboratory, they'll be put to work furthering Baxter sales. Graham wants to keep his growth record good —and new products have proved their worth in such an endeavor.

*Announcing the NEW...*

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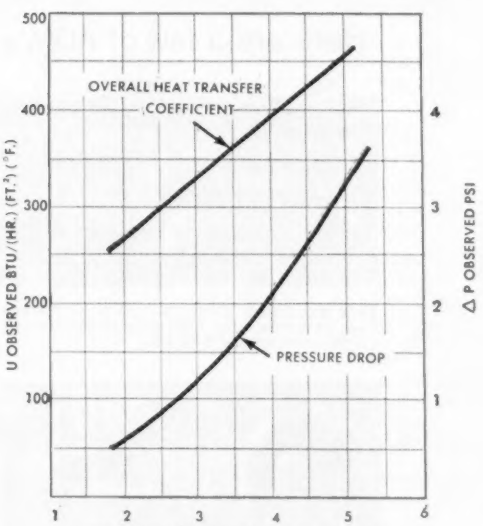


**TEST DATA FOR TYPE CFB HEAT EXCHANGER**
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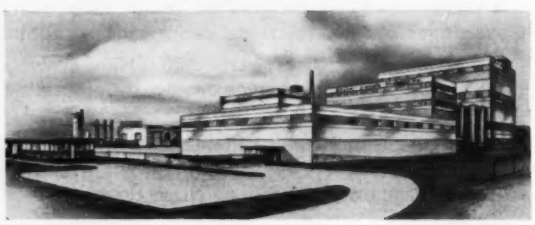

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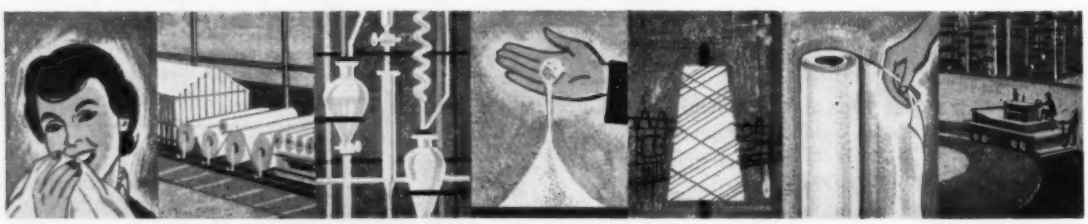

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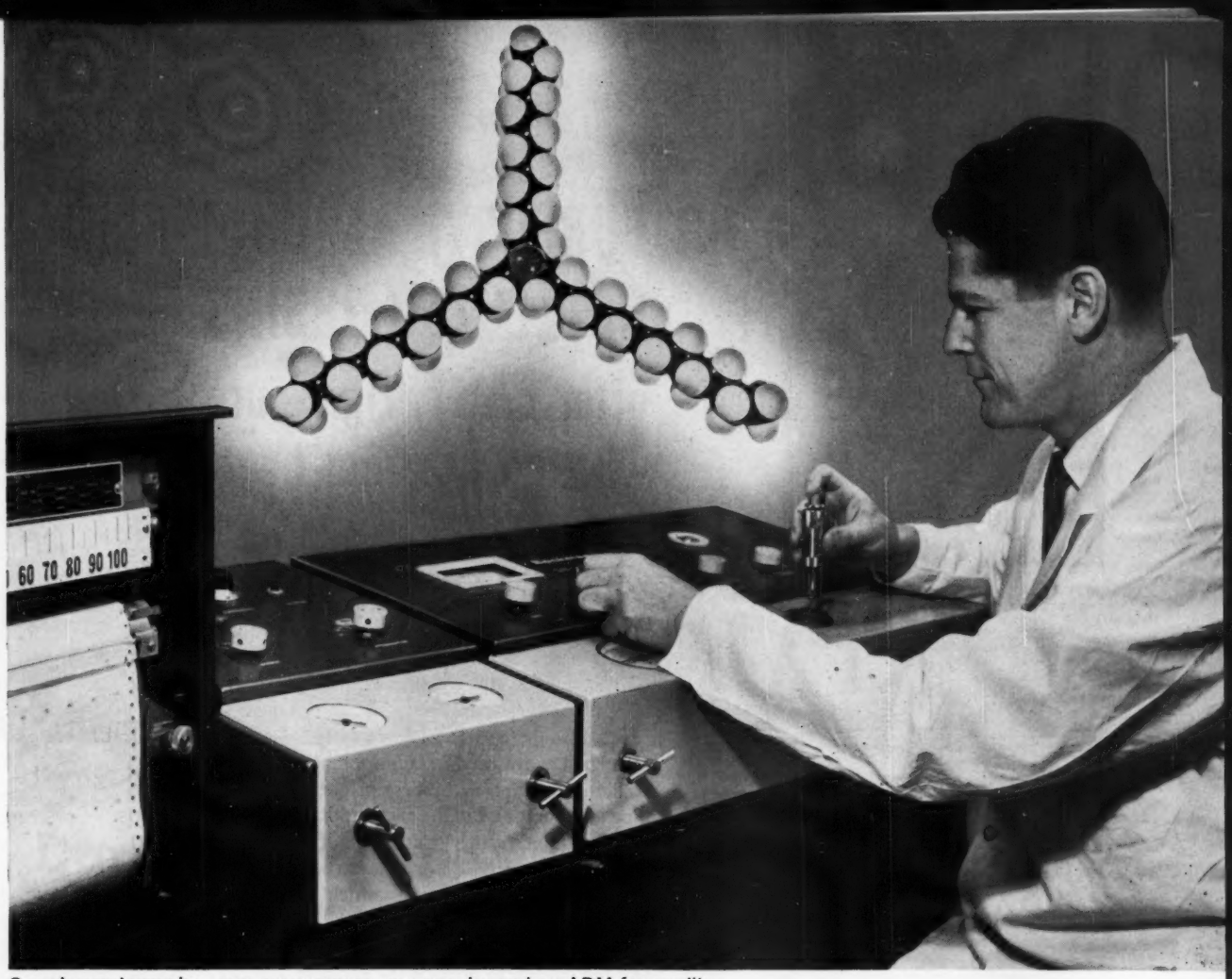


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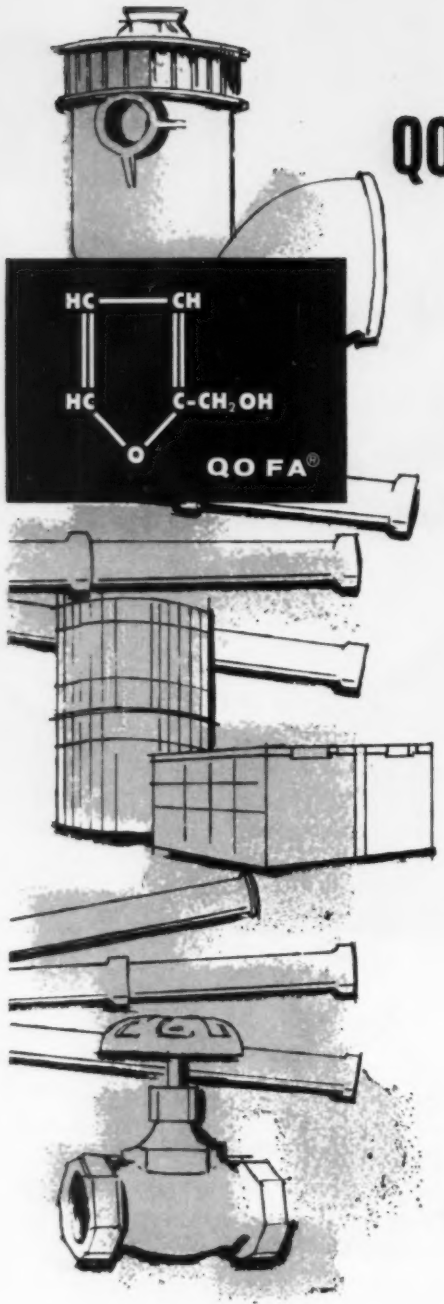


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**Heavier traffic, bigger payloads, trickier commodities accent question of highway safety.**

# Danger to Shippers in New Safety Probes?

**The conflict over the dangers to the nation in hauling chemicals on the highways — a long-smoldering controversy—is flaring anew. In recent weeks federal and local legislative bodies have begun probing transport practices; congressmen have called for tighter regulations. The chemical industry, moving almost one-third of its output via truck, sees no improvement in safety, only higher costs—direct and indirect—as outcome of the current fuss.**

Loudest complaints center about road safety regulations and practices. Severest critics, the railroads and their unions, have an obvious axe to grind; but the fact that other, more objective critics have joined the cry, has disturbed some chemical industry executives. Chemical process companies are directly concerned with aspects of the complaints and investigations — e.g., how ammonium nitrate is to be shipped; what should be maximum loads of hazardous chemicals in unmarked trucks; whether truck-carried collapsible rubber and plastic bags are safe for carrying corrosive or flammable materials.

It's easy to see why some chemical processors fear needless, tighter Interstate Commerce Commission regulations — which, by their requirements for excessive precaution, could lead to more costly shipping. Another worry: too much unwarranted accident publicity could bring higher insurance rates.

Most CPI traffic men, convinced that present ICC chemical trucking regulations and enforcement are adequate, are opposed to tighter rules. Looking at its safety procedures for truck hauling of chemicals, one producer reports, "There is constant study for improvement, but certainly no 'crash' program to revamp our trucking program. And we're not taking any chemicals off the highways to give back to the railroads."

**ICC Investigation:** But the industry's stand, of course, has not slowed investigations. Most recent safety inquiry (*CW Washington Newsletter, Feb. 18*) is one proposed by ICC: to cover grade-crossing collisions between chemical-carrying trucks and trains. Five rail brotherhoods, said to be alarmed over the number of train crew members killed in such accidents, and backed by 41 railroads in the Western district, first asked ICC for the probe last May.

At first ICC, believing there was little to be gained from the probe, denied the request. But continued pressure—from the unions, and from such figures as Rep. James E. Van Zandt (R., Pa.), who accused the commission of "crass indifference," and Rep. Cleveland M. Bailey (D., W. Va.), who suggested that ICC re-examine its rules for the transport of explosives—has changed this decision.

In its current plans ICC will broaden the investigation, cover most classes of hazardous CPI products.*

ICC has also made the railroads respondents in the investigation, as well as motor haulers of these materials. It is including state, county and municipal authorities having jurisdiction over safety of rail and motor operations, rail and motor associations and labor organizations, among others.

There is no doubt that ICC is taking the matter seriously. Public hearings, however, have yet to be scheduled, and there is no hint as to how long the investigation will last.

**New Welcome:** The National Tank

* For example, explosives, flammable or oxidizing liquids and solids, flammable or poisonous compressed gases, volatile liquids and solids that emit poisonous fumes, corrosive liquids and radioactive materials.

Bulk-packaged chemicals also face handling and shipping restrictions.

Truck Carriers, Inc., which had opposed the probe at first, now says it welcomes it, since any new rules are likely to apply to other transport forms as well as to highway tankers. And NTTC is convinced that the trucks' safety record is good: only 21 out of the 3,438 grade-crossing accidents each year (the average over a four-year period) involve ICC-regulated trucks.

"These data," NTTC says, "clearly show the very minor percentage of grade-crossing accidents involving for-hire tank-truck carriers subject to the commission's jurisdiction. Furthermore, accidents that did occur were not necessarily disastrous. Although tank trucks were involved in 0.6% of all grade-crossing accidents, fatalities resulting from such collisions were only 0.1% of the total, and injuries only 0.2%."

**Labeling Problem:** The matter of "labeling" trucks carrying hazardous chemicals, regardless of quantity, is getting mixed reception. On the one hand, proponents of more complete marking emphasize the danger to fire fighters and bystanders if a burning truck's contents are unknown. Reports Connecticut Deputy Fire Marshal Major Carroll E. Shaw: "The fire service is constantly being called out to fight fires in trucks that, by their appearance, give no indication that they may be carrying dangerous commodities. They find, sometimes to their dismay, that they are fighting some pretty hazardous materials" (*CW, Dec. 3, '60, p. 28*).

However, just where to set the weight limit for labeling purposes is a matter of economics and judgment. Many shippers are quick to point out that to mark the presence of all hazardous materials regardless of quantity—such as a drum of acetone or a can of lighter fluid—is economically unfeasible. And there's doubt whether any benefit would result from lowering the 2,500-lbs. limit or not—it's a matter of opinion and judgment.

**Growing Problem:** For both common carriers and chemical producers that carry their own products, the transport problems grow year by year. An estimated 400-plus new chemical products are introduced annually, many potentially hazardous. Although not all are shipped by truck, or even have much volume demand, critics feel that expanding technology needs more adequate supervision.

Even many old-timers are new to the roads. Chlorine and ethylene oxide, for example, were cleared for truck transport just this past year.

Even so, some producers are still wary about shifting from rail cars (*CW, March 19, '60, p. 31*). With more trucks on the road, fighting heavier auto traffic, exposure to possible collisions is increased. And larger tank capacities mean more danger in the event of an accident.

**Trucking Growth:** Regardless of the fears of more hazardous commodities on the highways, motor carriers, including chemical haulers, have enjoyed a booming business. Over the past decade, while the gross national product rose some 87%, motor carrier revenues gained a whopping 145%. At the same time, truck safety records show only about one reportable accident per 300,000 miles traveled.

**CPI Views:** Chemical shippers are voluble in praise of common carriers' record of highway safety. Taking into account the many new materials shipped over the roads each year, and the growth of all segments of the trucking industry, many observers are surprised that accidents are as few as they are. The consensus of several leading CPI traffic men: "It's unbelievable that there aren't more accidents—a tremendous tribute to ICC."

Chemical carriers are doing what they can on their own to improve safety. One leading chemical producer points out it has tripled its safety inspection efforts in the last six months. Another firm cites rerouting rail shipments of one of its more hazardous commodities to avoid congested areas where possible. Also the new routes are designed to run closer to airports so that professional help could be rushed to the scene in event of an accident.

**Insurance:** Some CPI traffic men fear that bad publicity for chemical trucking could lead to higher insurance rates. However, CHEMICAL WEEK has uncovered no real concern here. "After all," one company reports, "carriers will absorb these hikes, at least to a point. Even then, truckers won't raise their rates to a level that would price them out of the market." Another CPI shipper notes, "Insurance rates should depend on the individual carrier rather than on haulers as a whole."

The major object of bringing up the question of shipping safety, several producers point out, is to alert the public. The public—municipal advisory boards, unions or other interested persons—can determine if current regulations are adequate and well-enforced. Perhaps as important, the clamor could stimulate more careful transporting by all concerned, and such self-regulation could be more stringent—and more effective—than government regulation would be.

## Better Grease Handling

**Bulk handling** of lubricating greases—a family of products accounting for some 300 million lbs./year of lubricant sales—is beginning to catch on in the U.S. During recent weeks, Humble Oil & Refining Co. launched a new truck for grease deliveries, thus becoming the second U.S. petroleum producer to offer such deliveries (the other: Cities Service Oil Co.).

Main reason for the new shipping method is the inherent economy of bulk movements — reducing loading and unloading times, container needs and in-plant handling. And Humble will pass some of the savings to its customers: buyers will save ½-1¼ ¢/-lb. on posted prices, depending on the size of their orders.

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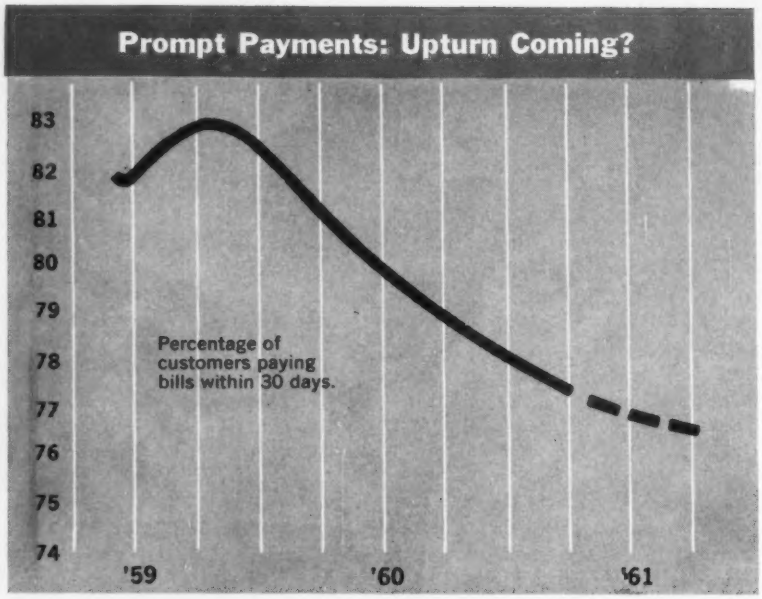


# Collections: Losing Battle

**Despite glimmers of optimism that the business recession will soon give way to an upturn, chemical process companies' sales and credit managers are in for continued difficulties with customers who want more time to pay their bills. That's the gist of a Chemical Week spot check completed last week.**

Chemical credit men are unhappy over the prospect that more of their once-prompt customers will join the ranks of the "take-now, pay-much-later" buyers. It means continued high-gear collection work, mounting accounts receivable, perhaps more borrowings to finance overdue accounts.

Chemical sales management men are equally disturbed. Their sales staffs must help convince customers to pay their bills more promptly—even pay off their long-overdue bills—or else explain to these customers that they cannot continue to ship to them. It's a tricky job, particularly when the products concerned are in oversupply. And to make their current troubles even worse, the consensus is that these problems will get somewhat tougher before they begin to ease off—probably late in the summer.

**Slower Payments:** Since '59 the percentage of CPI accounts that pay their bills within 30 days (considered by some credit men to be a reasonably accurate barometer of credit health) has been dropping off sharply, pointing up the bill payment lag (*CW, Sept. 3, '60, p. 61*). In fact, since last fall this percentage of prompt-paying customers has been lower than at any previous time in the last decade. Now, according to the Credit Research Foundation, Inc. (affiliated with the National Assn. of Credit Management in New York), the percentage of chemical company customers who are paying their bills within terms has dropped still further—this time to less than 77.5% (*chart, above*).

**Hardy Collection:** But chemical credit men have been trying hard to lure in some of the money that is owed their firms. And CRF's latest report shows that they've done a good job in keeping the situation from getting out of hand. Example: while the percentage of customers paying on a "current" basis has steadily dwindled, alert credit men have managed to prevent extensions of their collection period (number of days' sales still outstanding). In fact the average collection period for the chemical industry has improved somewhat from last fall—from 37.4 days' sales outstanding to 35.8 days. But according to most chemical credit men, they'll be hard-pressed even to hold the line during the coming months.

**Gas reforming hits a new high** Engineering news was made in France recently, when a Chemico high-pressure gas reform furnace operating at 250 psi was placed on stream. Prior to the completion of this project, no gas reformer in the world had ever operated at pressures above 175 psi. Design innovations incorporated in this plant reduce compression requirements and increase heat recovery.

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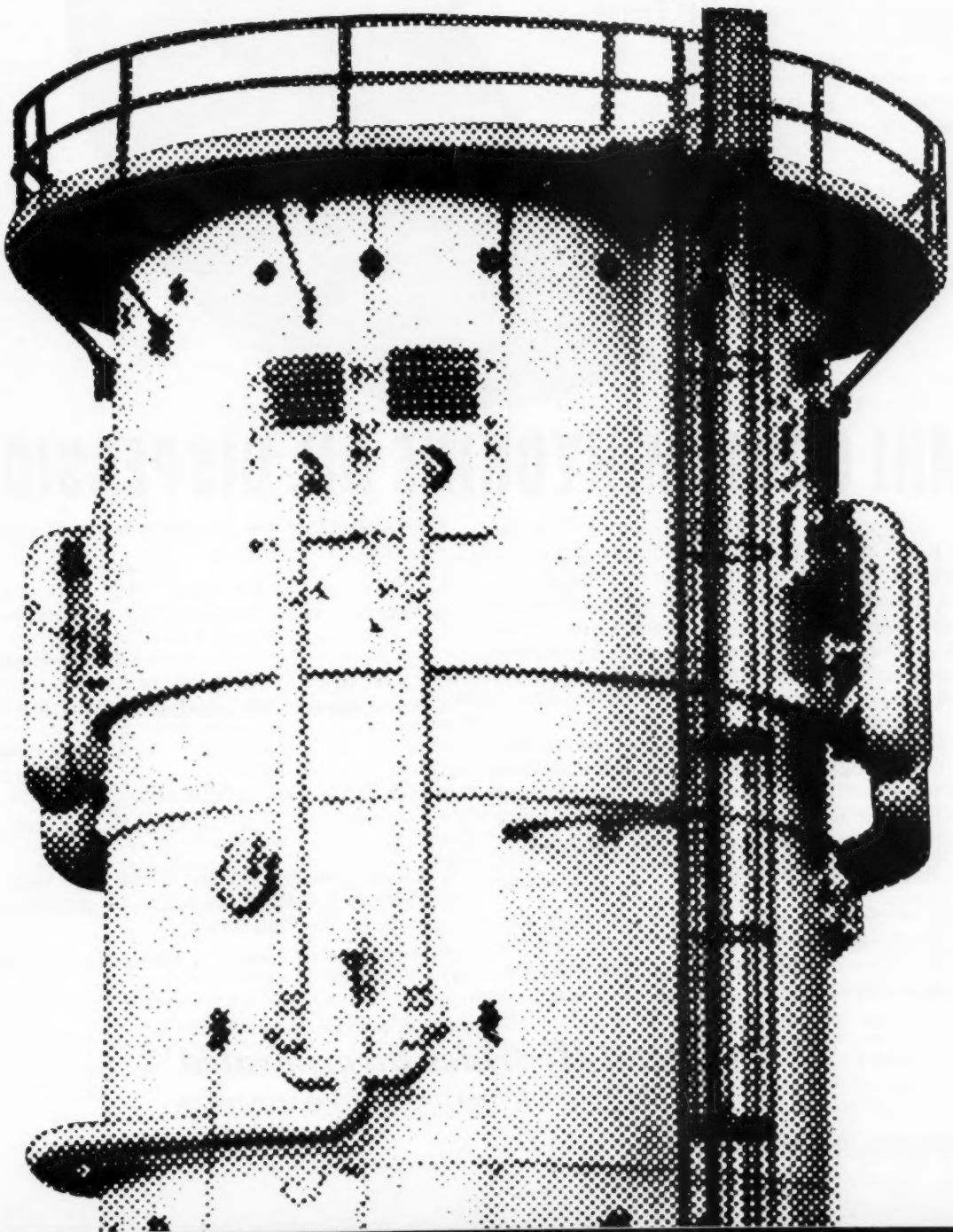

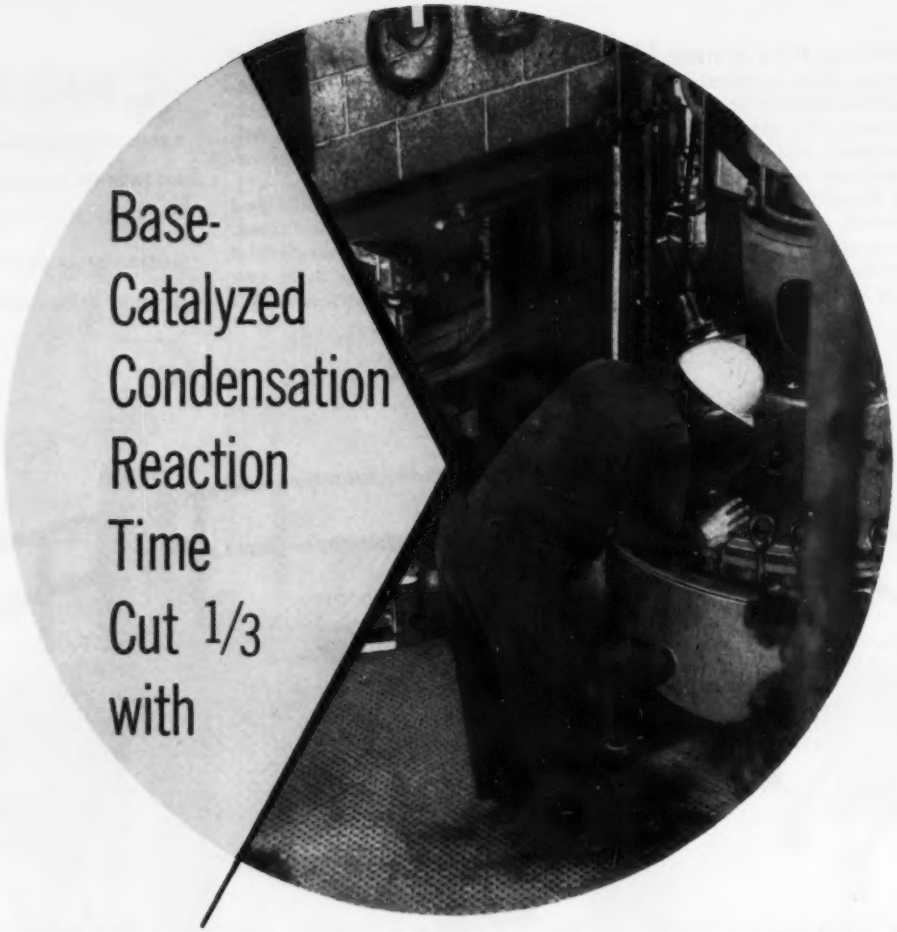


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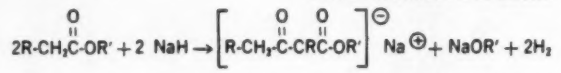
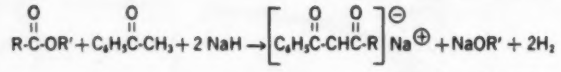
NaH Advantages Are Important In These Typical Reactions:

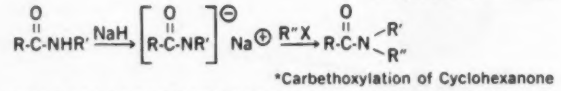
**Self-Condensation of Esters**




**Keto-Ester Condensations**




**Alkylation of amides**




*Carbethoxylation of Cyclohexanone

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# Jet Racks Up Good Process Record

***First on-the-job performance report boosts Pratt & Whitney, Cooper-Bessemer jet-engine power package for chemical plant jobs.***

**In Washington, D. C., last week,** gas turbine makers and users in this country and abroad reported on their progress at the Gas Turbine Power Conference of The American Society of Mechanical Engineers. The result: a vote of confidence for the gas turbine's reliability in today's process industry jobs and a promise of higher performance, lower cost, new designs and fuels for the future.

Of primary interest to the chemical process industries was a progress report on the performance of a highly promising gas turbine combination—the cost-cutting team of Pratt & Whitney's J-57 jet engine and Cooper-Bessemer's power turbine designated RT-248 (*CW, Sept. 12, '59, p. 55*). One such combination went into service last fall, driving a compressor at Columbia Gulf Transmission Co.'s Possum Trot, Ky., gas pipeline station (*CW, Nov. 26, '60, p. 84*), the first installation of a large (10,500 hp.) aircraft turbine for a process industry job.

C-B's vice-president and director of engineering, Ralph Boyer, speaking from notes rather than a formally prepared paper, set a precedent for turbine makers by discussing in detail the specific operating problems as well as the outstanding performance recorded during the first 1,500 hours of operation.

The turbine shows signs of more than meeting the performance requirements set for it. The problems it has had have been caused by the gas diffuser connecting the power turbine to the jet engine rather than by the jet engine and power turbine themselves.

A general inspection had been planned at the 1,000-hours operating mark, but was put off because the unit was performing so well. However, at the 1,186-hours mark, the vibration control equipment automatically shut down the unit because a blade on the power turbine broke. Inspection showed that a piece of the diffuser that carries the jet engine discharge into the power turbine had broken off and stuck against the stator vanes. This blocked off a portion of the gas flow, and the shock to the rotating blades of entering and leaving the dead area caused blade cracking.

Turbine blade cracking due to tramp material is not uncommon in other industrial models of gas turbines.

**On the Wing:** The shutdown enabled P&W and C-B to try out their scheme of pulling the jet engine off the line, flying it to P&W's East Hartford, Conn., shops for overhaul. (This procedure cuts down the need for on-the-spot maintenance, reduces a chemical process firm's inventory of spare parts.) P&W dismantled and inspected the jet engine, found only one cracked seal (believed to have been cracked during original assembly), which was replaced.

P&W followed its usual jet-engine inspection procedure, assembled the engine after inspection, subjected it to a test run (called a "green run"), dismantled it again for inspection. After final reassembly it was tested again and flown back to Possum Trot.

After another 416 hours of operation, the reinforced diffuser between engine and power turbine cracked, along with one of the struts in the exhaust casing of the engine head. The unit is running again and a gas-flow study is being made on the guess that a flow disturbance was the cause of the trouble.

**Meeting Performance:** In operating performance, the unit is meeting its working goal. It is carrying a load that is mostly above its 10,500-hp. rating—requirements have been for as much as 11,950 hp.

It is meeting its 25% design efficiency, without a regenerative cycle (use of exhaust gases to heat air to the combustion chamber) commonly used on ordinary industrial gas turbines in order to meet this mark.

Most industrial gas turbine makers are now talking of improving efficiency by increasing operating temperatures through the use of high-temperature construction materials. The RT-248 turbine appears to be in a good position to meet competition on this score, too. It has reached 25% efficiency while operating at about 1400 F. In aircraft applications. P&W says it has run the J-57 engine at 2000 F—well above the temperature needed to boost efficiency.

**Efficiency Emphasis:** Curt Keller, director of research and development of Escher Wyss Ltd., Zurich, Switzerland, gas turbine maker, good-naturedly chided U. S. turbine makers and users for pushing so hard for higher efficiencies. His contention: plant and maintenance simplicity are important gas turbine selling points, too. On these points, the aircraft engine appears to be scoring high. And many turbine makers are bent on moving their aircraft engines into industrial applications.

Pratt & Whitney, hoping to cash in on the success of its venture with Cooper-Bessemer, set up an industrial power department last summer to market jet engines with ratings from 350 to 15,000 hp. If heavy power turbines are needed as part of the power package, C-B will undoubtedly be brought into the picture.

General Electric is pushing its aircraft turbines in addition to its regular heavy industrial turbines for process company power jobs. Watching this trend closely are aircraft engine makers who have been out to get industrial jobs for some time. Among them: The Garrett Corp.'s AiResearch Manufacturing Divisions, International Harvester Co.'s Solar Aircraft subsidiary, AVCO Corp.'s Lycoming Division, and Bristol Siddeley Engines Ltd. in England.

**Coal Firing:** While the adaptation of aircraft engines to industrial power jobs is gaining wide attention, development of coal as a gas turbine fuel continues. Escher Wyss Ltd.'s Keller reports his firm now has six major

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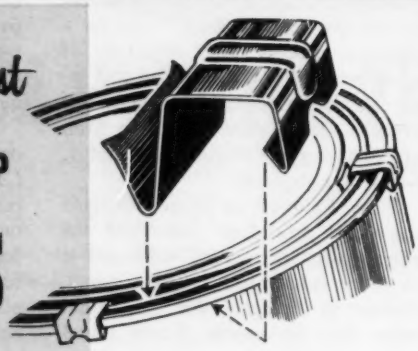

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power plants operating on its closed-cycle, gas turbine system, utilizing coal as a fuel.

In the closed-cycle system, air (or some other gas) heated by any feasible means is used to drive the turbine. Turbine exhaust is sent through heat exchangers and recycled. To many in the U.S., a closed-cycle system seems most attractive in a nuclear power plant system. It has not been tried here in a conventionally fueled power application.

Cost is the major factor. Keller says his firm's system can now be put in for a capital cost of about $125/-kilowatt for a 15-megawatt plant, about $105/kilowatt for a larger plant. This compares with a price of $85/kilowatt for a conventional gas turbine plant in the 5,000-25,000-kilowatt range, according to General Electric.

The direct-firing rather than closed-cycle approach for coal has been investigated in this country by the Bureau of Mines and others. But erosion of turbine blades has been an unsolved problem.

Whether or not the coal-fired gas turbine ever moves past the experimental stage in this country remains to be seen. But the aircraft engine seems assured a place in the power system of the chemical process industries plants.

## EQUIPMENT

**Packaged Compressors:** Dresser Industries' Clark Bros. Co. (Olean, N.Y.) is out with packaged field compressors for up to 1,000 hp. that are mounted on a 35-ft.-long skid. The package, of V-type design, includes two-cycle, turbo-charged, integral gas-engine-driven compressor with radiator, scrubber and accessories. Suggested uses: field gas gathering, repressuring, recycling plant feeders, refining, secondary recovery.

•

**Cryogenic Pipe Joint:** A flexible joint that provides gimbal and swivel movement for pipelines for rocket fuels, liquefied gases and chemicals is a new product of the Barco Manufacturing Co. (500 N. Hough St., Barrington, Ill.). The joints can be used for extension and contraction of pipelines, loading arms and swivels. Made of high-strength stainless steel, the joints can be used in the —325

U. S. STEEL reports:

## SMALL VALVE IN 4TH YEAR OF 'ROUND-THE-CLOCK' SERVICE!

It guards the outlet of one of the world's largest acid tanks for U. S. Steel. Here are the performance facts on this 4" Aloyco Gate Valve (made of Aloyco 20 Stainless Steel): It still shuts off tight. It has required no servicing except for minor packing adjustment. It has been on continuous 24-hour service for 4 years. People who pay for performance only, rely on Aloyco Stainless Steel Valves wherever corrosion is a problem. Want a safe, economical way to handle corrosives? Write: Alloy Steel Products Co., Inc., 1328 West Elizabeth Ave., Linden, New Jersey. 03

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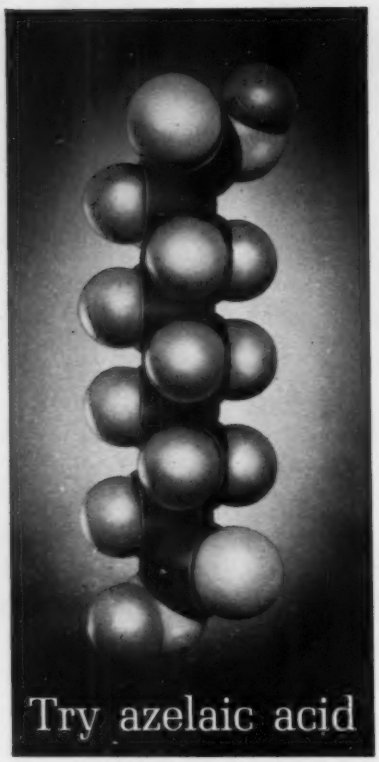

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In any field where dibasic acids are of interest, Emerox Azelaic Acid offers opportunities to achieve profitable differences in your present products, or to develop highly salable new products.

Azelaic's capacity to bring about significant "change" stems from its odd-carbon structure ($C_9$) which sets it apart from other commercial dibasic acids. Lower melting points that carry through to derivatives is just one example of its unusual nature.

Currently, Emerox Azelaic Acid is in wide use in low-temperature plasticizers, alkyd resins, polyesters and polyamides—applications which may suggest still other uses to you. And azelaic—produced from domestic raw materials—will shortly be available in more abundant supply when Emery activates its second producing facility.

Send for a sample or technical literature today and examine the possible utility of Emerox Azelaic Acid in your development program. Emery Industries, Inc., Dept. I-3A, Carew Tower, Cincinnati 2, Ohio.

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Export Division, Cincinnati 2, Ohio




to 275 F temperature range at operating pressures to 200 psi. Sizes: 2, 3, 4, 6, 8, 10 and 12 in.

•

**Electronic Pyrometer:** Metronix, Inc.'s (Chesterland, O.) new panel-mounted electronic pyrometer can be used to measure and control temperatures at distances up to 10,000 ft. because of its high input resistance. Called Model 600, it requires no zero adjustment after it leaves the factory, has an accuracy of ±2% of full-scale deflection, and comes in eight temperature ranges from 0-300 F to 0-3000 F.

•

**Seal Rings:** Allegheny Plastics, Inc. (Coraopolis, Pa.) is out with a new type of seal ring. The ring has an X-shaped cross-section, is said to combine the characteristics of rubber O-rings and the physical properties of Teflon. The X-shape eliminates the close-tolerance requirements of Teflon O-rings, permits installation with slight-to-moderate seal contact pressure on oscillating, reciprocating and rotating shafts, valves, bearings and cylinders. Operating temperature range: —300 to 500 F.

•

**Effluent Sampler:** Brailsford & Company, Inc.'s (670 Milton Road, Rye, N. Y.) new Model EP portable effluent sampler is designed for continuous liquid-waste sampling under explosive conditions. Motor, battery and other electrical components are housed in a cast aluminum case. The linear polyethylene, oscillating-cylinder pump samples at the rate of 1 gal./day. The unit weighs 15 lbs., will operate continuously for up to 1,000 hours on one battery (Eveready #520 equivalent).

•

**Rescue-Breathing Kit:** The American Optical Co. (Southbridge, Mass.) is offering its new Ambu, portable rescue breathing kit, as a supplement to mouth-to-mouth rescue breathing. The easily opened kit contains a resuscitator to give air and to start breathing. A foot-operated suction pump clears the breathing passages quickly. The resuscitator bag holds 1,000 cc. of air, delivers up to 700 cc. to the lungs when squeezed. This is more than can usually be delivered by mouth-to-mouth breathing but less than the lungs hold—so there is no danger of rupturing tissues.


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isobutyl alcohol

2-ethylhexyl alcohol

For properties and shipping information on these and other Eastman products, see **Chemical Materials Catalog**, page 363, or **Chemical Week Buyers' Guide**, page 107.

Eastman

# "4,500 gallons!...on Labor Day weekend?"

"The customer had reached me at home on the Labor Day weekend with a request for immediate delivery of 4,500 gallons of 2-ethylhexyl alcohol," said one of our New England representatives.

"I almost knew before asking that he was not going to define *immediate* as Tuesday or Wednesday. And he didn't disappoint me.

"'If a truck drove in right now, it would be an hour late,' he said. Then he went on about a very special and unexpected plasticizer order and how he was 'way short on the necessary 2-ethylhexyl alcohol and normally his raw material inventories were adequate and if he could get delivery right away he might be able to keep his process running, etc. So I promised to see what I could do.

"Luckily, I was able to catch our warehouse manager at home and after checking around he seemed to think he could get up a loading crew. I called the customer back to ease his mind a little... that just as soon as we could locate an available tank truck we'd be in business. That's when he told me about his faith in our service—he had already made arrangements for the tank truck.

"Within two hours we loaded and delivered. The customer confided later in the week that it was on time after all, and enabled him to meet his scheduled delivery date."

**Generally, we handle orders on a more scheduled, normal-business-hours, few-days'-notice basis. But if ever you feel the need to arrange for your own tank truck, then call us to fill it up—we'll do all we can to meet your requirements, even on Labor Day weekend.**

**Eastman** CHEMICAL PRODUCTS, INC., KINGSPORT, TENNESSEE, Subsidiary of Eastman Kodak Company

SALES OFFICES: **Eastman Chemical Products, Inc.,** Kingsport, Tennessee; Atlanta; Boston; Buffalo; Chicago; Cincinnati; Cleveland; Detroit; Greensboro, North Carolina; Houston; Kansas City, Missouri; New York City; Philadelphia; St. Louis.
**West Coast: Wilson & Geo. Meyer & Company,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

# NEWS FROM GOODRICH-GULF

## NEW SYNTHETIC RUBBER CAN REPLACE NATURAL 100% IN HEAVY DUTY TIRES

Goodrich-Gulf is now proceeding with a multi-million dollar plant for the commercial production of Ameripol CB (cis-polybutadiene) rubber. CB is the only known polybutadiene rubber which can be used as a 100% replacement for natural rubber in heavy duty tire treads.

In over 5 million miles of test driving on Ameripol CB tire treads, up to double the tread life of natural rubber has been achieved. Superiority is greatest in very severe conditions including heavy loading, long distances, and high-speed turnpike driving.

The first Goodrich-Gulf plant unit will produce at an annual rate of 20 million pounds. In addition, other companies will produce CB under license.

Ameripol CB has qualities which may be advantageous in applications beyond tires. Good electrical properties, abrasion resistance can provide superior coverings for electrical wires that are subjected to mechanical wear. Outstanding flex properties suggest superior performance in power transmission belting and conveyor belting.

This new development complements Goodrich-Gulf's production of Styrene-Butadiene Rubber (SBR) in non-pigmented hot, cold, and oil-extended types; and micro-black masterbatch cold, and cold oil-extended types.

Ameripol
THE PREFERRED RUBBER

## PROCESSING COSTS CUT WITH NEW MEDIUM-LOW VISCOSITY SBR

Newest addition to the Ameripol SBR family, Ameripol 4604, has the combined features of a high bound styrene with a minimum-low raw Mooney viscosity in the range of 30 to 42.

The high bound styrene content, together with medium-low viscosity, results in a cold polymer with excellent processing characteristics. Time is saved, and need for peptizing agents is eliminated.

### TYPICAL PHYSICAL PROPERTIES

(Based on test recipe of 100.0 parts Ameripol 4604, 40.0 parts EPC Black, 5.0 parts zinc oxide, 1.5 parts stearic acid, 2.0 parts Benzothiazyldisulfide, 2.0 parts sulfur).

| | | |
|---|---|---|
| Raw Viscosity, ML-4 @ 212°F. | | 40 |
| Compound Viscosity, ML-4 @ 212°F. | | 51 |
| | Cure @ 292°F. | |
| Tensile, psi | 50′ | 3080 |
| Elongation, % | 50′ | 745 |
| Modulus, 300%, psi | 25′ | 310 |
| 300%, psi | 50′ | 830 |
| 300%, psi | 100′ | 1260 |

Light color, low viscosity, outstanding physical properties, and low water absorption qualify Ameripol 4604 for products such as:

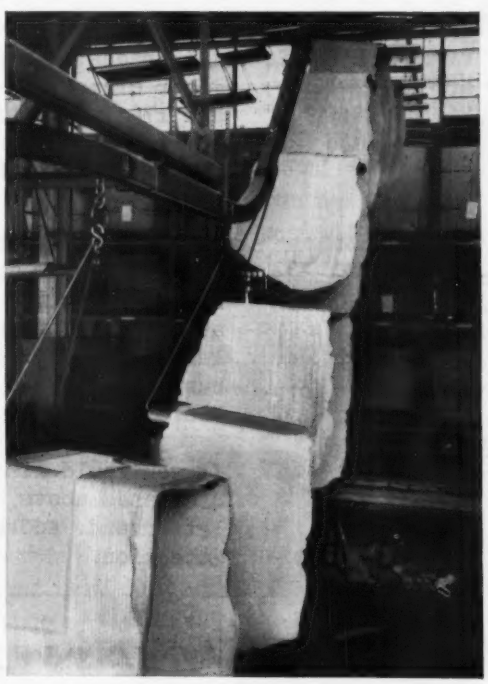
Closed Cell Sponge • Calendered Goods • Open Cell Sponge • Transfer Molded Items • Cements • Coated Fabrics • Adhesives • Hard Rubber

## AMERIPOL 4700 CUTS FLOOR MAT COST

**Each one of these automobile floor mats coming down the conveyor line at Anchor Industries, Inc., Cleveland, represents a savings over the previous rubber polymer used.**

**The mats are made from Ameripol 4700, which is a 50-part oil-extended rubber; thus costs substantially less than low-oil polymers. Ameripol 4700 maintains the high quality level this company has established; permits processing in a range of colors.**

**Since Goodrich-Gulf produces the broadest range of SBR polymers, we are in excellent position to help you in selecting the type which exactly meets your needs.**



For information, write: 1717 East Ninth Street, Cleveland 14, Ohio

**Goodrich-Gulf Chemicals, Inc.**

WORLD'S LARGEST SOURCE OF SYNTHETIC RUBBER

# CHEMICALS OUTLOOK

March, 1961

**This bulletin** is published to keep you posted on Wyandotte Key Chemicals, their applications, and the many services Wyandotte offers. You may want to route this to interested members of your organization. Additional information and trial quantities of Wyandotte Key Chemicals are available upon request . . . may we serve you?

## NEW HIGH-PERFORMANCE RIGID URETHANE FOAM SYSTEM

A totally new rigid urethane foam system based on Pluracol® PeP 450 tetrol has been developed through Wyandotte's continuing urethane research program.

This new foam system utilizes only one polyether — Pluracol PeP 450. The resulting low-density foams combine strength, excellent dimensional stability, low K-factor, and moldability to provide the applicator complete versatility in use. Laboratory data clearly show that this new rigid foam system is second to none on a cost-performance basis.

The second innovation in this new foam system is the use of trimethylpiperazine as the principal catalyst. Tri-MP, a Wyandotte development, is the key to the high performance of the rigid foams produced by this system.

## CALCIUM CHLORIDE NOW AVAILABLE IN FIBER DRUMS

All grades of Wyandotte Calcium Chloride are now available in fiber drums. The new, lighter drum is 15½ inches in diameter and 17¼ inches high. It has a full open head, and an aluminum barrier laminated into the wall. The pricing structure remains the same as for steel drums.

## PLURONIC L61 HELPS SOLVE FOAMING PROBLEMS

The use of Pluronic® L61 as a defoaming agent continues to grow. Its uses in the detergent industry are well known. But Pluronic L61 is also helping to control foam in such fields as metal cleaning, textiles, water treatment, air conditioning, leather finishing, and many others. No matter what type of business you are in, if foaming is a problem in your operations, Pluronic L61 may be just what you are looking for.

If you would like further information on any of the subjects discussed above, or product samples, write us on your company letterhead. Address inquiries to Department CO for prompt attention.

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# Market Newsletter

CHEMICAL WEEK
March 18, 1961

**A price cut on *p*-xylene may be in the cards.** Reason: Du Pont has reportedly developed a new, low-cost route to terephthalic acid from toluene. Currently, *p*-xylene is used as raw material for all terephthalic acid produced in the U.S. And terephthalic acid, which is a raw material in polyester fibers (e.g., Du Pont's Dacron) and films (e.g., Du Pont's Mylar) —both of which are big, fast-growing markets—represents the only sizable end-use for *p*-xylene. Observers expect that *p*-xylene prices will be cut to 11.5¢/lb. by Jan. 1, '62 from the current 13-15¢/lb. contract price range. When queried by CHEMICAL WEEK, three major *p*-xylene producers (Enjay, Oronite, Sinclair) declined to comment on any forthcoming price change.

•

**The first on-site plant designed to produce high-purity oxygen** for conversion into ozone was completed at Emery Industries' Cincinnati, O., plant last week. The new unit, built by Linde Co., a division of Union Carbide Corp., replaces the liquid-oxygen supply system previously used by Emery. The plant will also supply a second, larger ozone oxidation plant now nearing completion at Emery's Ivorydale operations. Coproduct nitrogen gas will be used for blanketing open storage tanks for chemical products and raw materials.

•

**Another 60,000 tons/year of ammonia capacity** is now onstream at the Memphis, Tenn., plant of Nitrogen Products Division of W. R. Grace & Co. This brings over-all ammonia capacity of the Nitrogen plant to more than 160,000 tons/year. The additional output potential will be used to satisfy in-plant requirements of ammonia for urea production, will also be sold on the open market. Until now, the firm's urea unit, which adjoins the new plant, had to obtain a portion of its ammonia requirements from outside sources.

•

**Polypropylene for use at elevated temperatures** (up to 300 F) is available in commercial quantities this week from Enjay Chemical Co. Identified as Escon 125 Ltha (long-term, heat aging) molding grade, the new material is geared for applications in molded parts that are subjected to repetitive, long-term heat exposure, such as backs for TV sets, radio cabinets, under-the-hood automotive parts, appliance covers and parts for washing machines, clothes dryers and dishwashers. Commercial tags: 46¢/lb. in 20,000-lb. lots; 47¢/lb., 5,000-19,999 lbs.; 48¢/lb., 2,000-4,999 lbs.; 52¢/lb., 200-1,999 lbs.

•

**New capacity for unsymmetrical dimethylhydrazine (UDMH)** was recently completed at Food Machinery and Chemical Corp.'s Baltimore, Md., plant. UDMH, an important outlet for methylamines (*see p.*

*89*), is used in the Titan II missile program. Equal amounts of UDMH and hydrazine are mixed to make the rocket fuel, which is then burned with nitrogen tetroxide oxidizer. Behind the expansion: FMC expects to supply quantities of 5-15 million lbs./year of its material, tradenamed Dimazine, to the Air Force for up to several years, under a long-term contract (*CW, June 11, '59, p. 22*).

Meanwhile, the firm points out, prices are moving lower. Price tags are less than half the $2/lb. that prevailed before last year's increase in Air Force needs; and the new price includes the amortization charges for the new privately financed expansion.

•

**Chemical truckers face closer scrutiny** as investigations into safety regulations and practices on both coasts move ahead. Public hearing dates have been set for April 19-20 by the California Public Utilities Commission in its investigation of truck hauling of hazardous chemicals in collapsible rubber and plastic tanks (*CW, Dec. 3, '60, p. 28*).

Meanwhile, in another inquiry into dangerous commodity trucking, ICC has named more respondents in its grade-crossing accident study (*CW Washington Newsletter, Feb. 18*). Truckers, the original respondents, welcome the addition of railroads, state, county and municipal transportation safety authorities, rail and motor associations and labor organizations and other interested persons to the investigation. The feeling is that any new rules from ICC are likely to apply to other transport forms as well as to highway haulers (*see story, p. 71*).

•

**Prices are toppling on two alcohols.** This week Quaker Oats revealed that it has slashed the tags on its tetrahydro-furfuryl alcohol by 6¢/lb. At the same time, it's changing the pricing basis of its furfuryl alcohol. Reason for the move: current expansion of the firm's Memphis, Tenn., plant, which will increase capacity about 50% for these two products. And it's expected that further price cuts will be forthcoming when the plant goes onstream. Tetrahydrofurfuryl alcohol tags: 25¢/lb. delivered east of Denver; 26¢/lb. on the West Coast. Furfuryl alcohol will now be sold on a delivered basis (formerly f.o.b. works), affording 1-1½¢/lb. price savings to users in major consuming areas.

•

**Foamed plastic bonded to fabrics** has stirred the vinyl area of the plastics business. Sales of polyvinyl chloride going into this outlet are estimated to have jumped from 1.4 million lbs. in '59 to 7 million lbs. last year and are expected to register another big gain this year. Meanwhile, one of the first patents (U.S. 2,964,799) in this field has been awarded to Naugatuck Chemical Division of U.S. Rubber Co. and covers the technique for foaming sheet-plastic laminated to a fabric backing. Naugatuck is considering licensing the process.

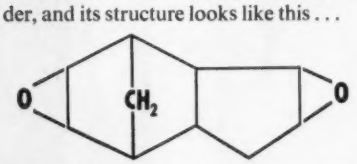
# Progress Report...

—New UNOX Diepoxides
—Morpholine

## New UNOX diepoxides for plastics

Many plastics producers are finding UNOX Epoxide 207 (dicyclopentadiene dioxide) an exciting new resin intermediate. With its compact molecular structure, UNOX 207 looks especially promising for high-temperature resins, glass fiber laminates, abrasive wheel and brake lining binders and adhesives, and encapsulating materials.

UNOX 207 is a white crystalline powder, and its structure looks like this . . .




The epoxy groups on UNOX Epoxide 207 are most reactive under acidic conditions. UNOX 207 cures rapidly with many common, low-cost hardeners to form plastics with high heat distortion temperatures. Illustrating this, test bars made with UNOX Epoxide 207, maleic anhydride, and trimethylol propane, retained a heat distortion temperature in the 300° C. range, even after aging for 400 hours at 260° C. Glass fiber laminates made from a system based on UNOX 207 were aged 192 hours at 500° F. and still had a flexural strength of 22,000 psi.

Diepoxide hardener systems have a long pot life at room temperature, but can be cured rapidly at higher temperatures. A good resin formulation for evaluation use is:

1.0 mole dicyclopentadiene dioxide
.8 mole maleic anhydride
.13 mole trimethylol propane

After being warmed slightly, then allowed to cool to 30° C., the resin has a viscosity of 100 cps. and a pot life of longer than a week. The mixture can be cured in a few minutes by raising its temperature to 130-140° C. For ultimate high heat distortion properties a high-temperature post-cure is recommended.

Stable "B" stage resins can be produced in solvent or as a dry powder. After six months on the shelf "B" stage UNOX 207 resins, prepared by prereacting 40 to 60 per cent of the available carboxyl groups, can be fused under mild pressures and temperatures of 160° C. They will also form up to 70 per cent solutions in acetone—toluene mixtures.

Fillers such as aluminum powder markedly improve impact strength and machineability. For two technical reports, "Resin-Forming Reactions of Epoxide 201" and "High-Temperature Epoxy Resins" or technical information sheets on UNOX Epoxides 206 and 207, please mail the coupon.

## Water-resistant rubless floor polishes

When the kids play Lord Nelson in the family tub, and the rain outside has a way of tracking itself indoors—waxed floors become the target for spotting and marring.

The problem facing the floor polish formulator is to develop a polish that is resistant to water-spotting, and that can be removed easily when the floors are washed.

Morpholine answers these problems—

First, and most important, polishes prepared with morpholine are water-resistant in less than an hour—normally twenty minutes after application. This speed is equaled by no other material. Yet polishes based on morpholine can be removed easily by scrubbing with soap and water.

Secondly, with morpholine, wide variations in formulation can be tolerated with no serious change in the emulsion. In fact, an excess of morpholine even provides freeze-thaw stability.

Polishes based on morpholine form bright, even, wear-resistant films on linoleum, mastic, hardwood, and other floor surfaces.

To find out how you can take advantage of the properties of morpholine, check the coupon below for a copy of the paper "Performance of Morpholine in Floor Polish—Rate of Development of Water Resistance."

---

**Tear out this coupon.** Check the boxes on which you'd like more information, and mail to Dept. H, Union Carbide Chemicals Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y.

- ☐ Resin-Forming Reactions
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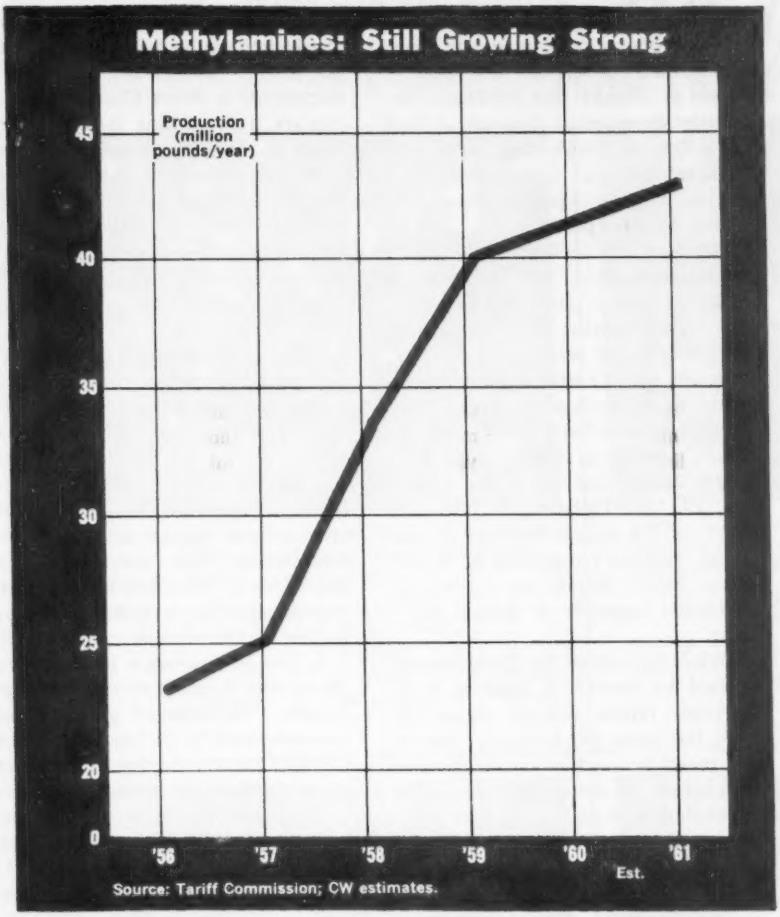


# Methylamines' Next Step: Up

**U.S. methylamines output has consistently set new records during the past several years, and '60 was no exception. In fact, the future holds steady growth—spectacular growth, if some breaks materialize. A sudden increase in demand for either the insecticide Sevin, or the rocket fuel unsymmetrical dimethylhydrazine (UDMH), for example, could mean a big boost in the call for methylamine raw materials.**

Meanwhile, enough capacity is now in place to give the industry ample output potential for the next few years.

Just last month, for example, another methylamines unit was put onstream by Du Pont at its Belle, W. Va., complex. Estimated capacity, about 20 million lbs./year, doubling Du Pont's total output potential (its other plant is situated in Strang, Tex.).

The new unit, unlike older plants turns out only two of the methylamines, the monomethyl and dimethyl types (and these are offered only in anhydrous form).

As things now shape up, dimethylamine (DMA) makes up the largest segment of the market, with demand probably 28-29 million lbs. in full-year '60; monomethylamine (MMA) moved at a pace of about 5-6 million lbs./year and trimethylamine (TMA) at 7.5 million lbs./year.

**UDMH Question:** The big uncertainty in DMA's future is, of course, unsymmetrical dimethylhydrazine. In the middle of last year, Food Machinery and Chemical Corp. was awarded a contract of more than $20 million for its Dimazine rocket fuel. FMC will be carrying out the job under a partnership arrangement with National Distillers and Chemical Corp. (*CW, June 11, '60 p. 22*).

Some of the deliveries will be made this year and will increase demand for DMA—it's expected that '61's fuel output should consume about 2.5 million lbs. of the amine starting material. And it's expected that during the next 2-3 years this figure will triple, depending on how the government calls for the rocket fuel. The deciding factor, then, in UDMH's and dimethylamine's future, is: How much, and for how long will the government continue to buy UDMH for its rocket program?

In any case, ample markets for DMA exist—primarily the manufacture of the synthetic fiber solvents, dimethylformamide, dimethylacetamide. Export is also a sizable market, but it is on the downgrade.

Exactly how much dimethylformamide and dimethylacetamide are consumed is a difficult question, subject to wide variations from year to year. Both materials are used in acrylic fiber manufacture, and depending on the amount of spinning solvent lost during operations, the figure varies widely. It can take a sharp jump if leaks occur or equipment is damaged. But in '60, it's likely that about 6-6.5 million lbs. of DMA went into dimethylformamide production and another 3 million lbs. went for dimethylacetamide.

Acrylic fiber production last year showed very little increase. For '61 the picture is somewhat better, but there probably won't be very much increase n production of these two solvents.

**Export Pinch:** The export market is one bleak spot in the DMA picture. It is believed that about 6-7 million lbs./year of material was shipped outside the country last year. But, the buildup of worldwide acrylic fiber plants has also spurred the growth of dimethylamine units.

Just last year a new plant was started by Persea Laboratorio Industriale in Italy. In addition, there are two plants in Germany; Badische Anilin Anilin- & Soda-Fabrik has one in West Germany and Leuna in East Germany. France has its own plant, owned by Service des Poudres, and Imperial Chemicals Industries has one in Eng-

land. Japan, another growing acrylic fiber producer, is also reported to have its own production facilities. Thus, during the next few years, foreign market for U.S. methylamines is expected to dry up.

Two other sizable outlets for DMA are in the manufacture of rubber chemicals and pesticides.

Chemicals that are derived from DMA are used as accelerators and "short stop" agents in rubber manufacture. While demand for rubber will continue to grow during the next few years the growth rate will be lower than during the past few years, due mostly to a slowdown in exports. Reason: foreign synthetic capacity will continue to mount. Last year about 40 million lbs. of DMA went into rubber chemicals, but because of a weak demand for new autos the demand will not go up much this year.

Demand for pesticides made from DMA was reported to be off somewhat in '60, due mostly to the weather. This, however, should readjust in '61, although no spectacular growth is foreseen during the next few years.

**Bug Killer Boom?** Monomethyl's big hopes are tied to an insecticide, Carbide's Sevin. Since its introduction in late '57, the bug killer has been moving steadily through required testing and clearance programs. A commercial production unit is said to be in final stages of construction at Institute, W.Va., and should be onstream shortly.

How big a bulge it will make in the methylamine market this year is moot. Because of the seasonal nature of the product, Carbide must soon start moving the insecticide into distribution channels to get maximum advantage of this year's market. Chances are, then, that the full impact of Sevin on the monomethylamine market won't be felt this year.

But prospects for next year are promising. So far Sevin has been cleared for use on cotton, some fruit and vegetable crops, ornamentals, shrubs and shade trees. In addition, it has attained limited clearance in the animal field, for use as a flea control on dogs and cats.

Aside from Sevin, the MMA segment of the market is not expected to climb spectacularly during the next few years, although moderate growth is expected. Last year 5-6 million lbs. of MMA were made.

**Trimethylamine Goes Captive:** The largest outlet for TMA is in the manufacture of choline salts. At one time these products were made by many companies, but this has now been cut down to three or four producers. Recently Commercial Solvents (which manufactures both the salts and amines) acquired four vitamin companies, which will give them a captive outlet for these products.

Choline salts took 6 million lbs. of trimethyamine in '60; this end-use will continue to grow moderately.

**Ample Capacity:** With completion of Du Pont's new Belle, W.Va., unit, the nation's total capacity is now close to 80 million lbs./year. Commercial Solvents has a 15-million-lbs./-year operation at Terre Haute, Ind.; Rohm & Haas has two plants, at Bristol, Pa., and Philadelphia. Each can turn out 7-8 million lbs./year of material. Pennsalt's operation at Wyandotte, Mich., rounds out the list; its estimated capacity: 8 million lbs./-year.

While the outlook for methylamines cannot be classed as dazzling, it is certainly bright. Growth during the next few years will be steady. And if the rocket fuel and insecticide demand catches on, the future will be rosy for some time to come.

## Itaconic on the Move

**Several recent developments** have triggered renewed interest in itaconic acid and its esters. The material excited quite a bit of attention back in '55, when Pfizer reported it was going into commercial production. But since then sales of the fermentation chemical have not quite lived up to the advance promotion its large-scale production generated.

In the last month, however, these developments have occurred: Pfizer, now the only producer acquired a one-third interest in Laboratori Italiani di Ricerca Chimica (LIRC), a Milan operation, which is making use of copolymers based on esters of itaconic acid to make transparent plastics for such end-uses as auto taillight covers and outdoor signs—products now big consumers of polymethylmethacrylates.

Also in the last few weeks Pfizer reported new price drops to 34.5/lb. c.l. for technical grades of itaconic acid and 39.5¢/ lb. for dimethyl itaconate and dibutyl itaconate.

Coupled with the Pfizer moves is Miles Chemical's decision to go into production of the material (*CW, Feb. 25, p. 57*). And another fermentation competitor is Bzura Chemical, which reports it is piloting itaconic in its Keyport, N.J., research labs.

A look at the chemical structure of itaconic acid (an unhindered double bond and two carboxyl groups, one of which is separated from finished polymer chains by a methylene group) gives the key to the interest in the material.

Because it's readily copolymerized with other monomers, itaconic acid is being used increasingly to build special properties into polymeric materials. By the use of itaconic acid, it's possible, for instance, to improve freeze-thaw and mechanical stability of emulsions; provide active sites for cross-linking with glycols, amines, diepoxides or polyvalent metal oxides; provide alkali or ammonia-solubilizing groups; and improve resistance to oil.

A look at itaconic's price history shows why it hasn't moved in better volume. The material got a lot of customers back in the late '30s when it was sold for 45¢/lb., but Pfizer could not profitably make it for volume uses at this price. The price of the commercial product hit the market with something of a thud at 60¢/lb. in '55. However, the price has come down steadily: 44¢/lb. in '56; 38.5¢/lb. in '58; 34.5¢/lb. in early '61. Today it's more attractive to potential users.

These users include plastic makers (to upgrade flexural strength of acrylate and styrene resins and improve light- and heat-stability of vinyl resins), adhesive makers (to improve rewettable gummed-tape adhesives), paint formulaters (to produce latexes based on copolymers of ethyl acrylate and dimethyl itaconates), and ion-exchange resin producers (to remove cations in liquid media). There are a number of other uses in the flexible film, pesticide, pharmaceutical and food fields, which make use of the material's multifunctionality.

Pfizer is making itaconic acid at its Groton, Conn., plant and also doing some esterification at Brooklyn and Greensboro, N.C.

Although itaconic is still not exactly in the intermediate chemical class, it seems to be moving further from the drum, closer to the car load.

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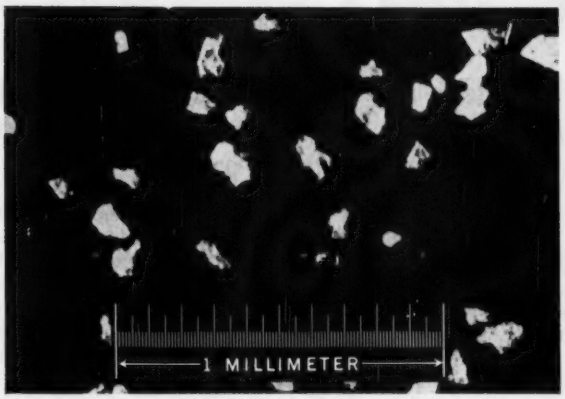


Sodium Bicarbonate U.S.P. Powdered No. 1—For general purpose use in chemical processing, dyestuffs, adhesives, starches, textiles and industrial applications.

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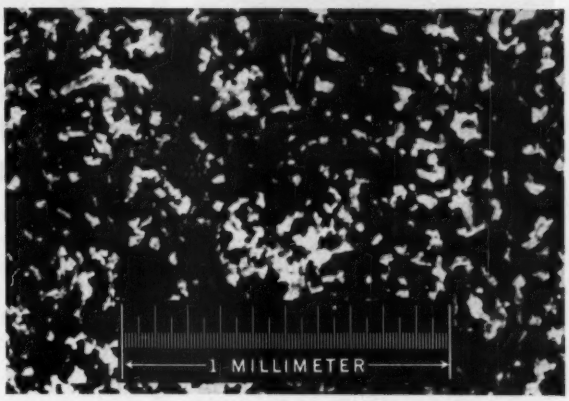
CUMULATIVE PERCENT RETAINED BY

| | | | |
|---|---|---|---|
| 42 Mesh | Trace | 200 Mesh | 35.0% |
| 100 Mesh | .5% | 325 Mesh | 70.0% |
| 170 Mesh | 20.0% | 400 Mesh | 80.0% |




Sodium Bicarbonate U.S.P. Fine Powdered No. 3DF for use specifically in dry powder fire extinguisher mixes, also in rubber and plastics blowing, lubricant for sheet vinyl.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

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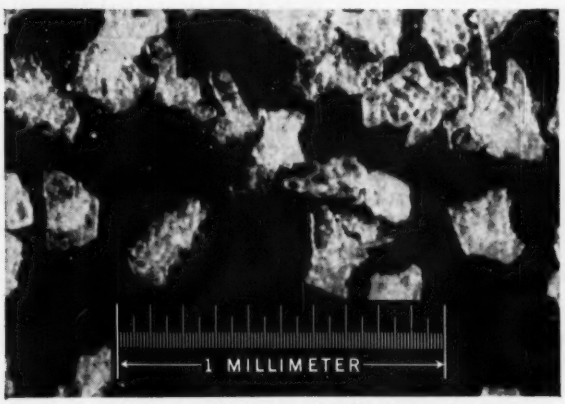
| 170 Mesh | Trace | 325 Mesh | 25.0% |
| 200 Mesh | 2.0% | 400 Mesh | 45.0% |




Sodium Bicarbonate U.S.P. Granular No. 5 for use in effervescent salts, other pharmaceuticals and special types of cleansers.

TYPICAL SCREEN ANALYSIS
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| | | | |
|---|---|---|---|
| 42 Mesh | Trace | 100 Mesh | 92.5% |
| 65 Mesh | 27.0% | 170 Mesh | 99.0% |
| 80 Mesh | 66.5% | | |

Sodium Bicarbonate U.S.P. Treated Free-Flowing for use in fire extinguishers and sponge rubber.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

| | | | |
|---|---|---|---|
| 42 Mesh | Trace | 200 Mesh | 35.0% |
| 100 Mesh | .5% | 325 Mesh | 70.0% |
| 170 Mesh | 20.0% | 400 Mesh | 80.0% |

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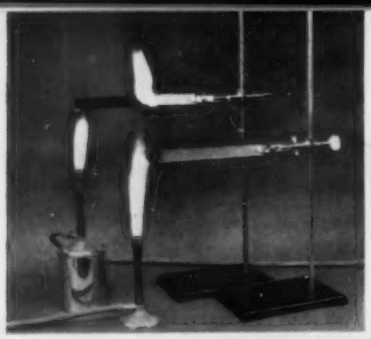


## TETRACHLOROBISPHENOL A... makes fire-retardant epoxy, polyester and polycarbonate resins

TCBP-A can be used to produce new resins with built-in fire protection. Resin formulators find that flame-retardant resins create new markets for myriad uses in bonding, foaming, casting, coating, and fabrication of structural laminates. The TCBP-A structure in the resin adds fire resistance to chemical resistance. As an example, flame-retardant epoxies (self-extinguishing by ASTM Test) can make "fire break" coatings for industrial plants and fire-resistant electrical panels; the polyesters can make fire-resistant building panels. In addition to fire resistance, most resins made with TCBP-A have excellent flexural and compressive strength and high temperature stability. For example, polycarbonates made with TCBP-A show outstanding strength at high temperatures . . . plus greatly increased toughness.

## SANTICIZER® 8 . . . protects and improves PVAc adhesive rubber-to-metal bonds

Polyvinyl acetate emulsion adhesives, plasticized with Santicizer 8, defy the solvating action of oils and greases . . . and develop high-strength "grip" between a wide variety of hard-to-bond materials, such as rubber to metal. Santicizer 8, a high-polarity plasticizer compatible with many resins, imparts good flow and wetting action, assures strong, quick tack and *long-lasting* flexibility.

Depending upon the degree of flexibility desired, the amount of Santicizer 8 in the formulation may range from 5 to 20 parts of the emulsion. For more dependable bonding of tough-to-join surfaces, try Santicizer 8 in your PVAc emulsion adhesives.

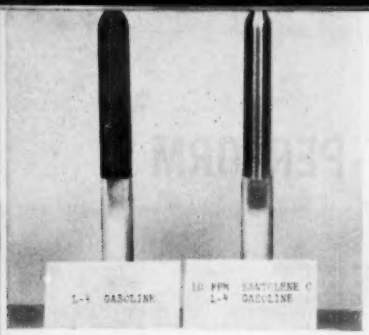
## *PARA*-TOLUENESULFONAMIDE.. gives lower-cost mildew protection to paints

Protecting water-base paints against fungi-souring in the can is good insurance for a brand's shelf life. And, protecting the applied oil-base and water-base films against the formation of discoloring fungus stains and "blotches"—no matter how severe the humidity exposure—is a distinct selling benefit. Such anti-mildew paints are particularly needed for white house paints used in the South. PTSA offers its protection against mildew formation to coating and impregnating varnishes, house paints, masonry paints and interior decorative finishes. Added as part of the solids in a range of 2 to 8%, PTSA prevents the growth of mold and mildew even under the high temperature and humidity of the tropics. PTSA blends readily into paint, varnish, and lacquer formulations. The free-flowing white powder does not interfere with pigmentation, is non-irritating and cuts the cost of formulating a mildew-resistant paint by approximately 50% compared to earlier anti-fungal additives.

# Monsanto Task Force Chemicals

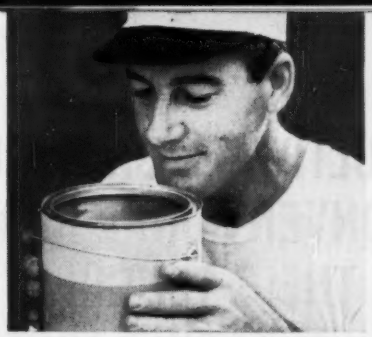
● Effective quality protection makes a product more valuable . . . but an expedient measure, like a new container or temporary preservative, may not be sufficient. *Chemical defenses*, built right into the product itself, safeguard quality all through manufacture, storage, *and in use*. Built-in protection pays off in stability, longer service life, and other advantages for you and your customers.

Check the benefits "built in" by the six protective products described above. Monsanto supplies a variety of compounds that protect color, clarity, retard oxidation, build resistance to heat stress, and stop destructive microorganisms. Could your products be improved by such built-in "bodyguards"?



## SANTOLENE® C...makes hydrocarbon products non-corrosive to metal

Santolene C inhibits rust formation in storage tanks, drums and metal packages by "plating out" a water-insoluble protective barrier film on the metal surface. It is an ashless organic liquid completely soluble in all kinds of petroleum distillates and derivatives and in most aromatic hydrocarbons. A brown mobile liquid—Santolene C makes hydrocarbons noncorrosive when "dosed" with concentrations in the range of 10 to 50 ppm. A major use of Santolene C is the protection of pipelines, tankers, and storage tanks used to store gasoline, petroleum solvents, fuel oil, and refinery fractions. Santolene C is a *one-shot, one-dose protectant* . . . even when metered into pipelines hundreds of miles long. It offers a dependable way to lengthen equipment life and protect products from contamination by metal corrosion.



## SANTICIZER® 160...protects nitrocellulose lacquers from rancid odors and possible "spewing"

Why have many lacquer makers replaced castor oil in nitrocellulose formulations? Answer: Santicizer 160 plasticizer . . . for these reasons:

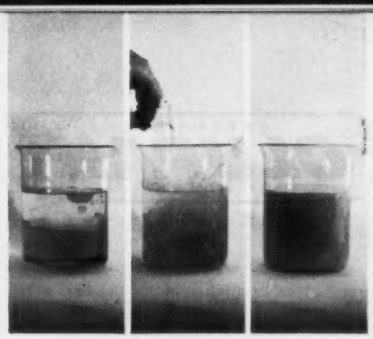
**1.** Castor oil has a low compatibility with nitrocellulose. To obtain needed lacquer properties, formulators sometimes exceed the compatibility limit. Consequently, exudation or "spewing" occurs. Partial or complete replacement of castor oil with Santicizer 160 helps eliminate the compatibility problem to prevent "spewing."

**2.** Castor oil may and often does give off a rancid odor. With chemically made Santicizer 160 . . . no odor whatever.

**3.** The lacquer formulator often must adjust castor oil viscosity to improve water resistance. Frequently this affects the film color. With Santicizer 160, no viscosity adjustment is necessary.

**4.** Santicizer 160 is dependable in price and supply; does not fluctuate in cost and availability as do natural materials.

For these four good reasons, more and more lacquer makers are protecting their nitrocellulose lacquer quality and performance by formulating with Santicizer 160.



## CYCLOHEXANOL "solubility bridge"...safeguards the stability of many resinous emulsions and polishing compounds

Where incompatibility of a formulation's components is a problem in a product's manufacture or performance, versatile Cyclohexanol may provide the answer. It's a mutual solvent for many resins, waxes, oils, and water . . . is used as a fast blending agent and reliable stabilizer in polishes, creams, greases, and resin mixtures. Cyclohexanol stabilizes the emulsion of oil-type water-base paints; improves flow-out and gloss of cellulose nitrate lacquers; "carries" the water content of specialized dry cleaning compounds; stabilizes textile scouring preparations and helps emulsify wool grease. It acts as a mutual solvent for alkyd resins, nitrocellulose, rosin, rubber polymers, vinyls, oils, and gums . . . effectively countering their incompatibilities. Cyclohexanol's strong solvating action makes it especially valuable in vapor degreasing formulations . . . or as a stable blender-emulsifier in leather dressings, polishes, and floor waxes. If you're concerned about homogenization of resinous emulsions, chances are that versatile Cyclohexanol can improve and stabilize your products.

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CW PHOTO—HAL KELLY

**USDA's LaBrecque checks effectiveness of trial chemical sterilants for insects in cage-filled room.**

# Focusing on New Insect Control Methods

**Chemical sterilants—newest of the insect control methods—are the object of study by G. C. LaBrecque (picture) and coworkers at the Orlando, Fla., laboratory of the U.S. Dept. of Agriculture's Entomology Research Division.**

A promising improvement on radiation sterilization (itself relatively new), chemosterilants may one day be ready to join the growing number of new chemical and biological insect fighters (e.g., attractants, antimetabolites, desiccants, microbial agents, viruses).

LaBrecque's work has turned up at least three effective compounds, based on laboratory studies, but their large-scale usefulness and toxicity are matters that have not been fully determined. The three agents recently reported by LaBrecque to the Entomological Society of America are ethylene imine derivatives that have previously been studied as cancer-fighting and textile-treating compounds. Tabbed aphoxide, aphomide and apholate by LaBrecque, they are (respectively): tris(1-aziridinyl)phosphine oxide; N,N′-ethylene bis [P,P-bis(1-aziridinyl) - N-methylphosphinic amide]; and hexakis(1-aziridinyl)phosphonitrilate.

These materials, also known as radiomimetic compounds or alkylating agents (because they resemble fundamental genetic materials with hydrogen atoms replaced by alkyl groups), are the most effective on house flies among hundreds that have been screened at the Orlando lab. Antimetabolites such as aminopterin and amethopterin have been successful in sterilizing only female fruit flies and house flies.

**More Deadly Than Killing:** According to Edward Knipling, director of the Entomology Research Division, sterilization can be a much faster-acting and more permanent form of control than killing the insect (assuming that neither method will be 100% effective initially).

Radiation sterilization, tested only in the past five years, has lived up to its early promise of high effectiveness. According to Knipling's calculations, a

**Update: Weapons in the War on Insects**

| | Features | Status |
|---|---|---|
| **NATURAL BALANCE**<br>Other insects<br>Parasites and diseases<br>Birds and larger animals | Effective but not fully controllable; could create new problems. | Most basic of all methods; without it, the others couldn't cope with the problem. Predatory insects have been used in some cases, and microbial and viral insecticides are being tried. |
| **RESISTANT PLANTS**<br>Crop strains specially bred for insect resistance | Plants resist insects either by tolerating them better or by having built-in defenses; called the best approach, where it works. | Isolated cases of resistant strains have been developed (wheat immune to Hessian fly, alfalfa immune to spotted alfalfa aphid); 10-25 years would be needed to develop a specific resistant strain. |
| **CHEMICAL (AND RADIOLOGICAL)**<br>Contact insecticides<br>Fumigants<br>Soil fumigants<br>Antimetabolites<br>Attractants<br>Radiation sterilization<br>Chemical sterilization | Highly versatile; can be tailored to fight specific insects or broad classes; possible problems of safety, action on desirable insects. | Basis of about 90% of current methods; new work in chemical sterilants and attractants (e.g., gypsy moth lure). |
| **CULTURAL CONTROL**<br>Destroy nesting places<br>Controlled planting time | Removes circumstances that bring insect and plant together; not fully controllable. | Effective in some cases where group effort can be maintained (e.g., against the pink bollworm in southern Texas). |

population of 95% sterilized insects would die out in four or five generations. Killing 95% of an insect population, however, leaves enough healthy insects to re-establish the original number in about eight generations.

A highly successful experiment in Curacao led to a full-scale test in the Southeast. From '58 to '59, about two billion screw-worm flies that had been gamma-irradiated by a cobalt-60 source were spread over Florida (a large portion of which forms a wintering ground for the insect). Eradication has been so complete that not a single screw-worm has been seen in the area since '59.

Among the major problems associated with radiation sterilization are the necessity of releasing about 10 times more insects than are already present, and the difficulty and cost of raising, irradiating and dispersing enormous numbers of insects. If the original population is too large to allow temporary 10-fold multiplication, then 90% eradication by conventional insecticides would bring it down to a size that could be multiplied temporarily.

However, chemical sterilants would also solve this problem plus that of rearing and irradiating captive insects. If an effective, nontoxic, economical chemosterilant could be developed, it could simply be applied to existing insect populations, with theoretical results the same as with the radiation technique.

**Attractant Newcomer:** Newest development in the field of attractants is the recent commercialization by Interchemical Corp. (New York) of gyplure, a synthetic gypsy moth attractant developed by Martin Jacobson at USDA's Beltsville, Md., research center. Starting with a natural extract found to be highly attractive to male gypsy moths, Jacobson first identified the active ingredient, then synthesized it and finally synthesized an equally effective homolog that can be manufactured more readily. The natural material is 10-acetoxy-1-hydroxy-7-hexadecene, while the commercial material is 12-acetoxy-1-hydroxy-9-octadecene.

An effective attractant is only half the battle, though, as the moth must be killed after being attracted. Field tests using the new lure with insecticides will be started this summer.

Success in using attractants in conjunction with insecticides has already been achieved, notably in ridding Florida of the Mediterranean fruit fly (Medfly). In '56-'57, USDA used the isopropyl ester of 6-methyl-3-cyclohexene-1-carboxylic acid (produced for it by Union Carbide) as an attractant in Medfly traps used to determine the extent of Medfly infestations. Another attractant, enzymatic protein hydrolysate produced by A. E. Staley Mfg. Co. (Decatur, Ill.), was mixed with malathion before spraying, cut the insecticide requirement by 75%.

Effective lures have also been developed for the melon fly (4-[*p*-acetoxyphenyl]-2-butanone), the Oriental fruit fly (methyl eugenol) and the European chafer (butyl sorbate). Trubek Laboratories (East Rutherford, N.J.) makes a number of such compounds.

**Other Chemical Methods:** Other relatively new chemical approaches to insect control take a variety of forms. Antimetabolites, for instance, resemble nutritional substances vital to the insect's growth, but do not provide the needed nourishment. Carpet beetles that feed on compounds similar in structure to vitamins or amino acids satisfy their appetite for these nutrients, but eventually die. Roy Pence at the University of California at Los Angeles has demonstrated an antimetabolite spray (*CW, Nov. 19, '60, p. 72*).

W. R. Grace's Davison Chemical Division is promoting the use of silica gel as a desiccant insecticide. The material dehydrates the insect.

Systemic insecticides that permeate the plant either from external application or through the root system are also under active development.

These types are all in addition to conventional contact- and stomach-acting insecticides, fumigants, and soil fumigants (materials that volatilize to kill soil insects).

**Nature's Way:** Natural methods of insect control (i.e., predators, parasites, bacteria, viruses) can also be adapted to controlled use, but not as

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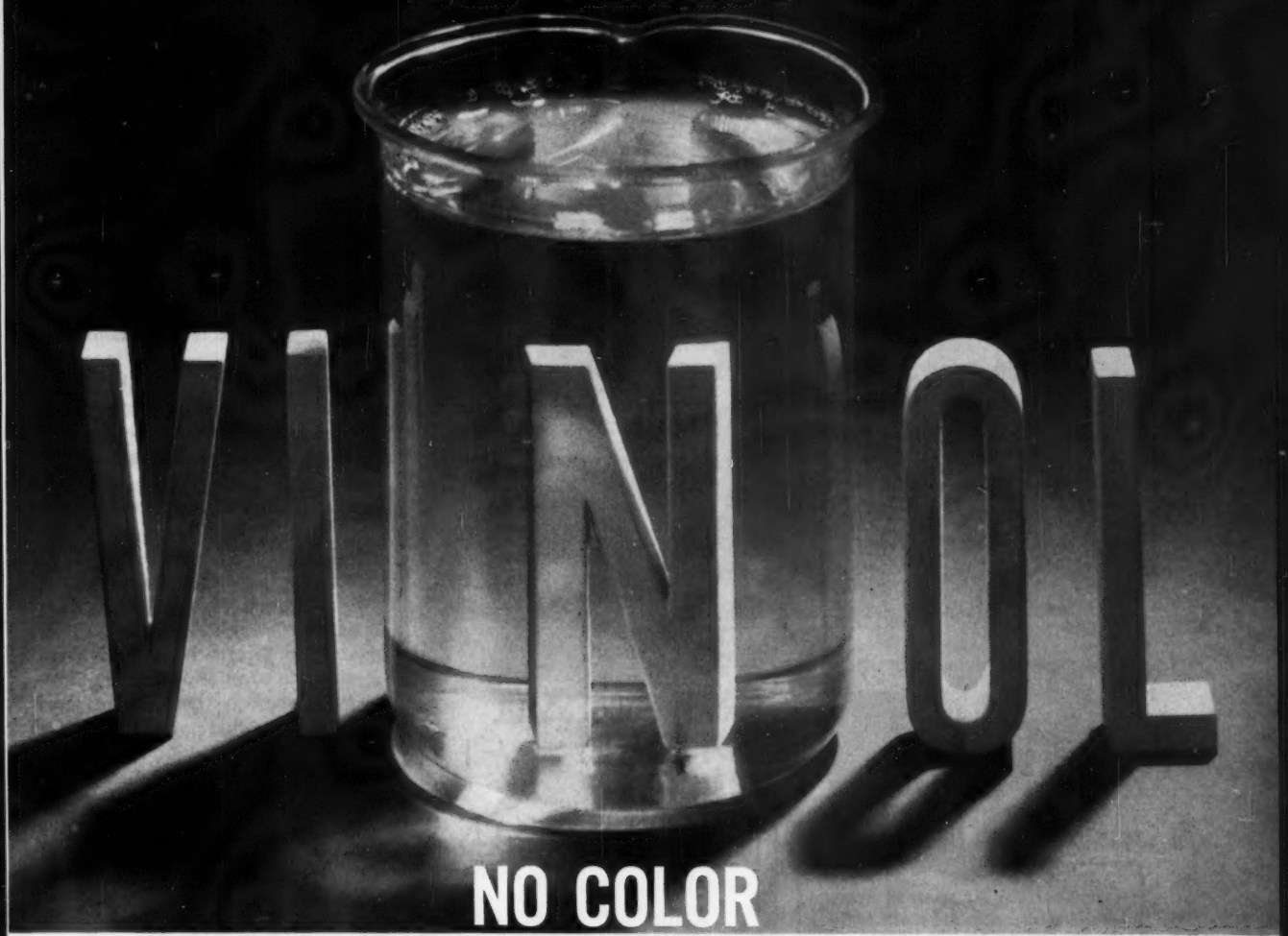


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easily as can chemical methods. In some cases, natural enemies of a particular insect can be imported as a control agent, but care must be taken that the newcomer does not create a new problem, either by becoming a pest itself or by feeding on desirable insects.

Microbial agents for insect control are on the upswing. Known for many years, *Bacillus thuringiensis* Berliner is now being marketed by a number of firms (e.g., Stauffer's Thuricide, Pennsalt's Biotrol, Rohm & Haas Co.'s new Bakthane). This microbe has been found effective against a variety of leaf-eating insects, especially the cabbage looper and tobacco hornworm.

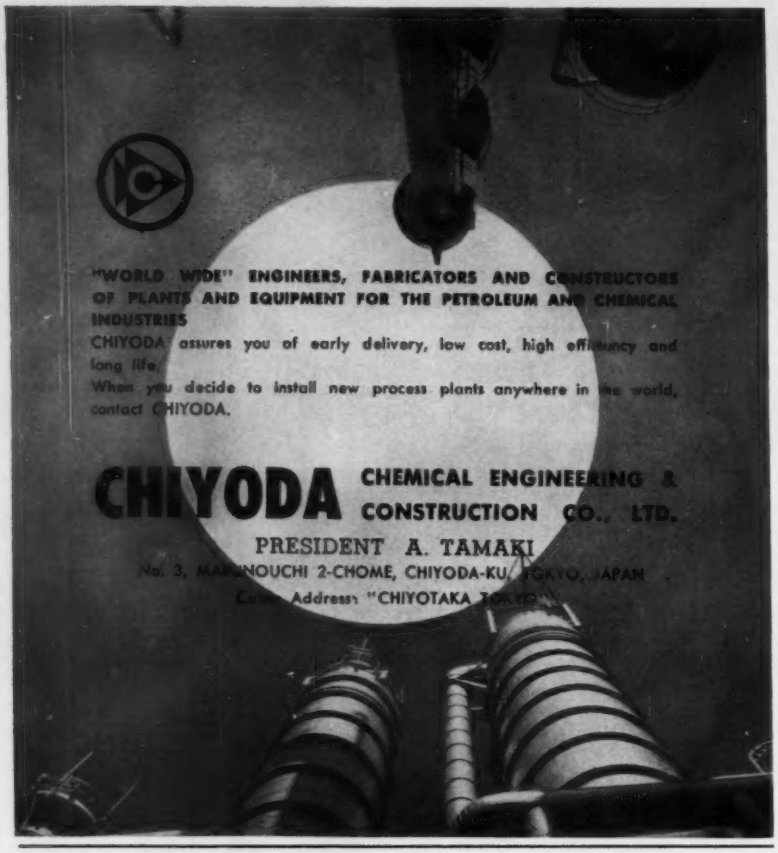
Currently undergoing large-scale tests in three states and a number of foreign countries is a method that uses bacteria-carrying nematode larvae to control the codling moth. The nematode larvae are applied by spraying. They attack the moth larvae, which are killed by the bacteria.

Another biological approach uses viruses to attack the insects. Now under test in several states (e.g., Indiana, New Jersey) is a virus that's particularly effective against the European pine sawfly. One advantage is that very small amounts would be needed.

**Indirect Approaches:** Less direct than the foregoing approaches, but more effective in certain cases, are the two other broad categories of insect control methods: cultural control and development of resistant plant strains.

Cultural control embraces all the farming practices that have been worked out to disrupt the insects' preferred routine. Examples: plowing up soil insects that want to avoid the sun; planting at times that will produce crops when the insects are at a nondestructive stage; rotating crops that are attractive to different insects; cleaning out potential insect nesting places. Controlled planting time of cotton in southern Texas combined with careful destruction of cotton bolls has proved effective against the pink bollworm in that area.

Resistant varieties of crops have been developed that protect themselves against certain insects. The resistant strain may be physically unattractive to the insect, chemically repugnant to it, or simply able to withstand more damage than could a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nonresistant strain. Successful use of this method has been made in the cases of wheat vs. the Hessian fly and alfalfa vs. the spotted alfalfa aphid. However, as long as 10-25 years may be needed to develop a specific strain resistant to a given insect.

**Outlook for Chemicals:** Although natural and indirect methods play a big part in insect control, there appears to be a still-growing place for chemicals and mass-produced biological agents in the continuous war against insects. One thought that emphasizes the importance of this task: man has not yet completely eradicated a single insect species from the earth.

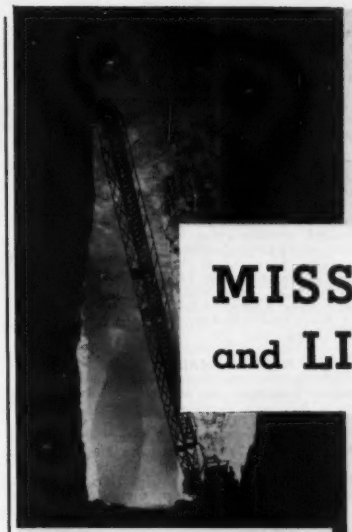
## Blood Chemicals

**Chemicals to help treat and prevent strokes and heart attacks are in the news this week.**

The first, designed for use in patients who have a blood clot, is urokinase-activated plasmin, a clot-dissolver developed by Dr. Julian Ambrus and coworkers of the University of Buffalo Medical School and Roswell Park Memorial Institute. Similar in action to streptokinase-activated plasmin, the new material has the advantage of being derived from human sources, does not give allergic reaction on repeated use.

Work on an enzymatic anticoagulant—a compound that keeps blood clots from forming—is being continued at Cornell University under a $42,000 extension of a National Science Foundation contract. Goal of the work, by George Hess and a team of eight researchers, is a short-term anticoagulant (one whose effects would wear off in a few days). The enzymes being tested are from among the class that controls blood clotting.

Another project, by Dr. Benjamin McConnell of Florida Southern College, involves the use of commercial bioflavonoid-vitamin C compounds to strengthen the walls of blood vessels for prevention of minor strokes. Dr. McConnell, who has reported successful trials of the method using U.S. Vitamin & Pharmaceutical Corp.'s CVP, holds that three out of four such strokes are caused by blood seepage through vessel walls rather than by blockage of arteries.

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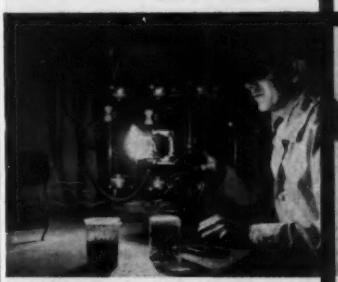

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## Nudge for Nutrition

**Nutrition research** is receiving a push on two new fronts: (1) establishment of an Institute of Nutrition by Corn Products Co. (New York); and (2) confirmation of a theory on amino acid requirements in the diet, developed by Charles Jarowski, director of pharmaceutical research and development for Chas. Pfizer & Co.

Purpose of the new institute: encouragement and support of nutrition research, plus public education. It will become the focal point of all CP nutritional research activities. Director will be Albert Elder, former coordinator of research.

Jarowski's theory is that the balance of amino acids required by a species is proportional to the amounts of the acids found in its blood plasma. This idea was used by Milton Winitz of the National Institutes of Health to develop a combination of amino acids known as Diet No. 154, which produces better growth results than the best previous synthetic diet, No. 116. This is said to be the first time that a laboratory diet has been worked out according to a theoretical principle rather than by an empirical approach.

## PRODUCTS

**Polymer Intermediates:** Diamond Alkali Co. is producing semicommercial quantities of isophthaloyl and terephthaloyl chlorides at Greens Bayou, Tex. The two chlorides are suggested for use as polymer intermediates and for syntheses of dyes, plasticizers and pharmaceuticals.

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**Column Packing:** Neopentyl glycol succinate polymer and chromatographic column packings coated with the polymer are newly available from Applied Science Laboratories (State College, Pa.).

•

**Pure Amines:** Ames Laboratories, Inc. (South Norwalk, Conn.), is offering a new line of high-purity amines, including *o*-, *m*-, and *p*-fluorobenzylamines, 1-naphthyl methylamine and n-octylamine.

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**Specialty Solvents:** Henley & Co., Inc. (202 East 44th St., New York 17) now offers methyl isopropyl ketone and β-methoxy propionitrile for use as solvents and organic intermediates.

# Chemical Week

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901 Vaughan Bldg., 1712 Commerce St., Riverside 7-9721

**Detroit 26** ..... H. J. Sweger, Jr.,
856 Penobscot Bldg., WOodward 2-1793

**Frankfurt/Main** ..... Stanley Kimes,
85 Westendstrasse, Germany

**Geneva** ..... Michael R. Zeynel
2 Place du Port, Geneva, Switz.

**Houston 25** ..... Gene Holand
W-724 Prudential Bldg., JAckson 6-1281

**London W1** ..... E. E. Schirmer, N. Murphy,
McGraw-Hill House, 34 Dover St., England

**Los Angeles 17** ..... Robert Yocom,
1125 West Sixth St., HUntley 2-5450

**New York 36** .... Charles Haines, Bruce A. Johnson, Paul F. McPherson, Charles F. Onasch, L. Charles Todaro, 500 5th Ave., OXford 5-5959

**Philadelphia 3** .... William B. Hannum, Jr., J.E.B. Ladouceur, 6 Penn Center Plaza, LOcust 8-4330

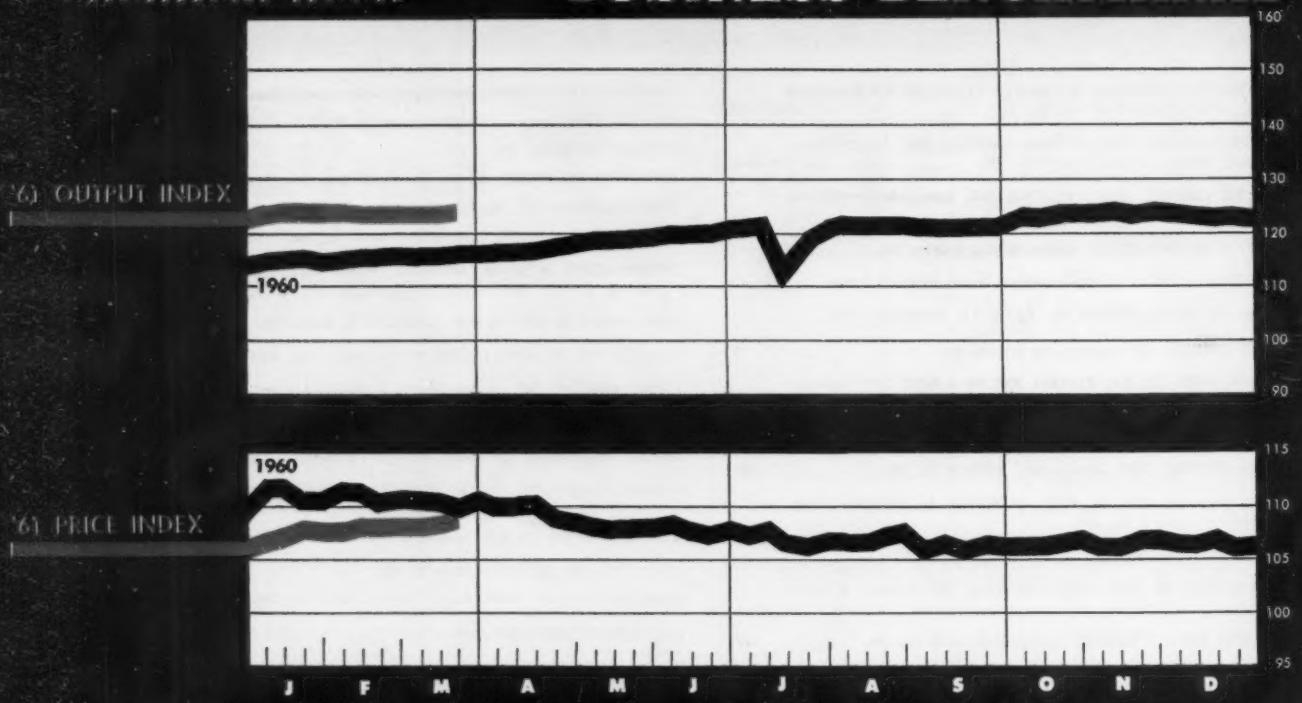
**Pittsburgh 22** ..... Duncan C. Stephens,
4 Gateway Center, EXpress 1-1314

**Portland 4** ..... Scott B. Hubbard
Room 445, Pacific Bldg.

**St. Louis 8** ..... R. J. Claussen
3615 Olive St., Continental Bldg., JEfferson 5-4867

**San Francisco 4** ..... William C. Woolston
255 California St., DOuglas 2-4600

# BUSINESS BENCHMARKS



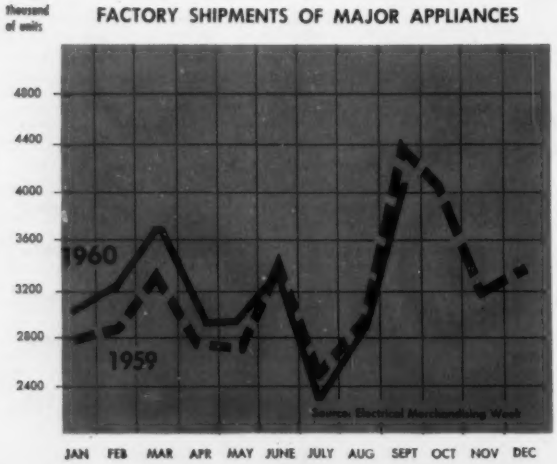

MARCH 18, 1961

| WEEKLY BUSINESS INDICATORS | Latest Week | Preceding Week | Year Ago |
|---|---|---|---|
| Chemical Week output index (1957=100) | 125.0 | 124.8 | 118.0 |
| Chemical Week wholesale price index (1947=100) | 110.6 | 109.0 | 110.8 |
| Stock price index (12 firms, Standard & Poor's) | 50.96 | 51.01 | 52.26 |
| Steel ingot output (thousand tons) | 1,580 | 1,582 | 2,645 |
| Electric power (million kilowatt-hours) | 14,226 | 14,239 | 14,370 |
| Crude oil and condensate (daily av., thousand bbls.) | 7,240 | 7,207 | 7,152 |

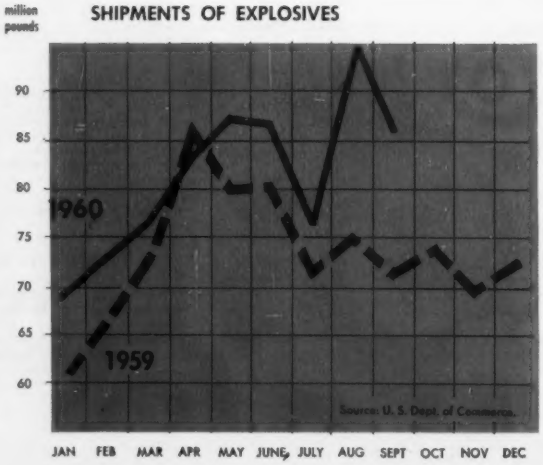
| FOREIGN TRADE INDICATORS | EXPORTS | | | IMPORTS | | |
|---|---|---|---|---|---|---|
| (million dollars) | Latest Month | Preceding Month | Year Ago | Latest Month | Preceding Month | Year Ago |
| Chemicals, total | 140.1 | 132.9 | 152.4 | 29.8 | 24.6 | 34.1 |
| Coal-tar products | 14.7 | 14.6 | 13.1 | 8.0 | 4.8 | 7.4 |
| Industrial chemicals | 24.1 | 24.6 | 29.5 | 10.5 | 8.5 | 10.7 |
| Medicinals and pharmaceuticals | 22.8 | 22.0 | 25.2 | 1.9 | 2.5 | 2.1 |
| Fertilizers and materials | 9.8 | 7.7 | 12.4 | 6.7 | 5.6 | 11.4 |
| Vegetable oils and fat (inedible) | 14.5 | 13.1 | 6.4 | 6.3 | 5.1 | 7.2 |

## CHEMICAL CUSTOMERS CLOSE-UP

FACTORY SHIPMENTS OF MAJOR APPLIANCES




SHIPMENTS OF EXPLOSIVES



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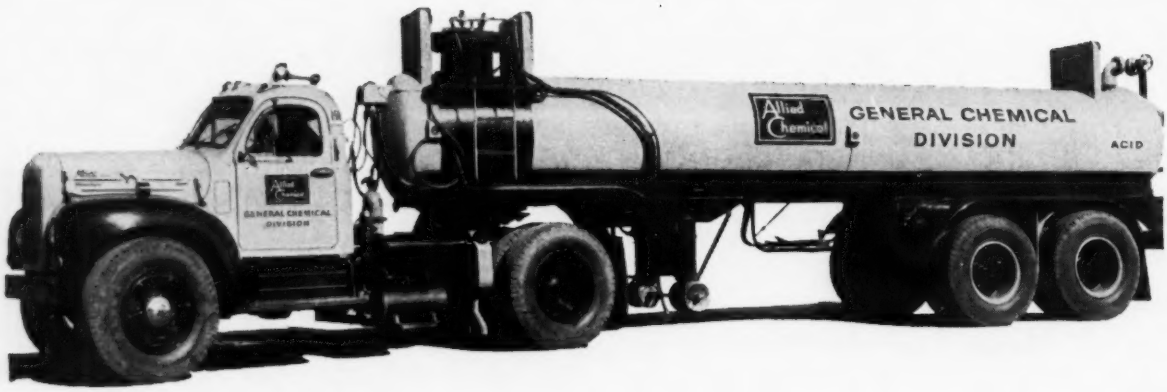
PETROCHEMICALS DEPARTMENT, GULF OIL CORPORATION, PITTSBURGH, PENNSYLVANIA

# Now... HF by Tank-Transport Delivery

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